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U.S. DEPARTMENT OF COMMERCE / National Bureau of Standards

Report of the
65th National Conference
on
Weights and Measures
1980



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Report of the

65th National Conference on Weights and Measures 1980

*Sponsored by the National Bureau of Standards
Attended by Officials from the Various
States, Counties, and Cities, and
Representatives from U.S. Government,
Industry, and Consumer Organizations
Washington, DC, June 23-27, 1980*

Report Editors: Harold F. Wollin
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National Bureau of Standards
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ABSTRACT

This is the proceedings of the Sixty-fifth National Conference on Weights and Measures, sponsored by the National Bureau of Standards, held in Washington, D.C., June 22-27, 1980, and attended by State, county, and city weights and measures officials, and representatives of the Federal Government, business, industry, and consumer organizations. The publication includes papers presented by Conference officials and other top authorities from Government and industry in the United States and several foreign countries. Reports by the several standing and annual committees of the Conference are also included.

Major issues discussed at the National Conference included measurement science education, enforcement uniformity, national type approval, computers and micro-electronics, new design and performance requirements for weighing and measuring technology, radiation measurements, metric conversion of retail gasoline dispensers, and weights and measures program evaluation.

Key words: Domestic standards; education programs; electronic devices; international recommendations; legal metrology; measurement assurance; metrication; model laws and regulations; packing and labeling; specifications and tolerances; technology transfer; weights and measures.

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The number of years each committee member has remaining to serve on the committee as of the 65th Conference is shown in parentheses. Also noted are the new appointees and newly designated committee chairmen.

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(Kendrick J. Simila, State of Oregon, was appointed for a 5-year term to replace Mr. Greene, whose term expired. Dr. Heffron replaced Mr. Greene as chairman.)

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Virginia Wollin

METROLOGY WORKSHOPS

There were three metrologist's workshops scheduled during Conference week. The purpose of these workshops was primarily to train State and local metrologists in laboratory calibration procedures and techniques.

Monday, June 23, 1980

and

Tuesday, June 24, 1980

OPEN COMMITTEE HEARINGS

Monday and Tuesday were set aside for hearings of the five Conference Standing Committees. Notices of these hearings were carried in the Conference Announcement booklet, in all pre-Conference publicity, and in the printed Conference program. Many delegates participated in the committee hearings and presentations were given by representatives of weights and measures, industry, government, and consumer groups. The discussions that took place played an important role in guiding the committees in their deliberations and in the preparations of their final reports. The final reports of the committees will follow later in this publication and will reflect the discussions that took place and the actions taken by the Conference at the time the final reports were presented to the delegates.

EXPECTATIONS FOR THE EIGHTIES

Presented by CHARLES H. VINCENT - Conference Chairman,
and Director, Department of Consumer Affairs, City of
Dallas, Texas



In beginning, I want to welcome all of you to Washington, D.C. for the 65th National Conference on Weights and Measures. I want to extend a particularly enthusiastic welcome to our visitors from other nations.

We are honored and flattered that a number of weights and measures officials from other nations who were in the City last week for the meeting of the International Organization of Legal Metrology have been

able to remain here for this Conference. The United States is most pleased to have had the opportunity to host OIML, and we appreciate your joining us this week for the exchange of views and the pursuit of common interests.

Your presence here offers United States officials a unique opportunity for exposure to the functioning of the international community of legal metrology. Being well aware of the motivation and persistence of U.S. officials, I am certain that full advantage will be taken of this rare opportunity.

For the edification of our OIML visitors, let me present a brief descriptive summary of this Conference. The National Conference on Weights and Measures is an organization of weights and measures enforcement officials of the States, counties, and cities of the United States, along with officials of the Federal Government, and representatives of manufacturers, industry, business, consumers, and other interested persons. The annual meeting of the Conference brings together these enforcement officials and representatives of the public and private sectors to discuss and act on matters that relate to weights and measures technology and administration.

The Committees of the National Conference represent all areas of this economically important segment of government regulatory service. The Conference develops and adopts model laws and regulations, technical codes for weighing and measuring devices used in commerce, test

methods, enforcement procedures, and administrative guidelines that serve as recommendations to enforcement officials in the interest of promoting uniformity of requirements and methods among State and local jurisdictions.

A major objective of the Conference is to foster understanding and cooperation among weights and measures officials and between them and all industry, business, and consumer interests.

In summary, the fundamental goal of the National Conference on Weights and Measures is uniformity! The Conference motto is . . . "That Equity May Prevail."

This Conference is sponsored by the National Bureau of Standards which also furnishes the necessary technical and professional staff support. Without the strong and enthusiastic support that the Bureau of Standards has historically provided, I am firmly convinced that the National Conference on Weights and Measures would be unable to continue as a viable and effective organization in responding to public measurement needs.

This 65th National Conference is significant in a number of different ways. To me it symbolizes in a very real sense our organization's formal beginning of the new decade of the 1980s. I am certain that all of you have a variety of impressions as to what this new decade will hold in store. I share with you such a broad spectrum of impressions.

I certainly do not lay claim to even the slightest degree of clairvoyance. However, a rather philosophic analysis of the recent past and the imminent future has led me to one projection for the 1980s that I consider to be valid. That projection is as follows: For weights and measures, or legal metrology in the United States, the 1980s will be characterized by dramatic technological change and by intensified demands upon technical and regulatory resources.

In looking ahead at this new decade of the '80s, I think that how we frame our perspective will be critical to our ability to shape and to control our collective destiny as weights and measures officials. I think that our initial and fundamental choice will be that of viewing probable future events either in the positive context of challenge, or in the negative context of threat.

Adherence to the positive concept of challenge will, I think, underlie our ability to respond effectively to the broadened measurement demands of the 1980s. In spite

of our occasional tendency to sell ourselves short in the public arena, the history of weights and measures administration in the United States has been one of continuing, effective response to changing conditions, needs, and circumstances. To gain a more concise view of the increasing complexity of our regulatory endeavor, one needs merely to compare an annual Conference program of 20 years ago to the program that will guide our activities this week. I would venture that someone who had been out of touch for the past 20 years would be astounded by some of the topics that we will discuss and examine this week. I would predict also that those of us here today would be equally amazed at the content of the 1990 Conference program if we were able to view it at present in the form that I expect it will take.

In departing from the past, I think we can legitimately indulge ourselves in the conclusion that the weights and measures regulatory system in the United States has performed responsibly, with a relatively high degree of efficiency, and with a continuing and genuine focus on the public interest. In embarking on the course of the future, however, I think we have to free ourselves of indulgence and nostalgia. We can begin this transition by looking analytically at the broad challenges that the 1980s promise.

In deference to the several very distinguished speakers who will address us this morning, I am anxious to confine my remarks to as brief a period as is possible. However, in looking at the 1980s, there are several broad considerations that I think should underlie and set the tone for our deliberations this week. These are:

DEFINITION OF MEASUREMENT PRIORITIES

By and large, I think it is reasonable to conclude that we have relied more heavily up until now on tradition than on comprehensive research and analysis in determining how State and local regulatory resources will be utilized in responding to perceived public needs. I consider it a certainty that our resources will diminish in the future in relation to the expanding demands that will be placed upon them. This being the case, our responsibility to our constituents will demand a strict definition of priorities and of programs to respond to those priorities.

I am pleased to note and to emphasize one very important development in this area. It is a National Measurement Study, which is being sponsored by the National Bureau of Standards. That study, which I believe Dr. Ambler plans to discuss, represents a necessary response

to concerns we must face, and it merits the full support of this Conference, of our regional organizations, and of industry. The Scale Manufacturers Association made a very important contribution in this area through the innovative concept of a National Metrological Control Program discussed at our Conference last year and also during our recent Interim Committee Meetings.

IMPROVED ALLOCATIONS OF REGULATORY RESOURCES

In context, the critical need for optimal utilization of State and local regulatory resources is obvious. Such attempted optimization will require dramatic improvements in our managerial and technical capabilities. To achieve such improvements, we must look toward new liaisons between legal metrology and the academic community. As Conference Chairman this year, I have had the very thrilling opportunity to be a part of tentative discussions of possible new relationships in this area. Dr. Bryce Jordan, the President of the University of Texas at Dallas, will discuss one such possible program with us. Another similar program is being considered by Texas A&M University, my alma mater. Dr. Lee Phillips is here from A&M.

RECOGNITION OF INTERNATIONAL RELATIONSHIPS AND NEEDS

The hosting of the OIML Conference this year by the United States and the presence of a number of distinguished officials from other nations serves to stress, I think, the increasing importance of uniform measurement standards and programs at the international level. I am grateful to our colleagues from abroad for presenting us with an opportunity for enhancement of our international measurement perspective as we prepare to meet more complex domestic challenges in legal metrology.

CONTINUATION OF STATE AND LOCAL CONTROL OF WEIGHTS AND MEASURES

There is no question in my mind that the basic structure of weights and measures regulation in the United States is sound. I am also convinced that the public interest in this nation will be best served by perpetuation of regulatory control at the State and local level. This, of course, will require continuation of technical and professional staff support at the Federal level such as that which we now receive from the National Bureau of Standards.

The alternative would be the exercise of Federal regulatory authority in weights and measures, which this

Conference has traditionally resisted. I predict that our posture in this regard will remain unchanged.

I have spoken briefly of the challenges that the 1980s are sure to hold for legal metrology in the United States. I am confident that we can master these challenges and continue to serve the public interest effectively. One thing I expect to remain unchanged is the spirit of dedication common to weights and measures officials. That spirit of dedication translates into basic integrity, which will, I am sure, continue to guide our efforts in the 1980s and assure the success of those efforts so that equity will, indeed, prevail.

1980 - A DIAMOND ANNIVERSARY, A GOLDEN OPPORTUNITY

An Address by ERNEST AMBLER, Director
National Bureau of Standards



As always, it is my great pleasure to be with you. This Conference, more than any other group I know, is living proof that cooperation between various levels of government, and between government and industry, can work. The Conference motto--that equity may prevail--of course refers to equity in the marketplace. But I believe it also means equity between all members of this organization. Equity and cooperation have always been the hallmarks of Conference activities, and must remain so if we are to continue serving the American public.

It was 75 years ago that Samuel Stratton, the first Director of the National Bureau of Standards, opened the inaugural meeting of the National Conference on Weights and Measures. Attending at that time were 11 people--two from NBS, one from the District of Columbia, and one each from the states of Iowa, Kentucky, Massachusetts, Michigan, New Hampshire, Pennsylvania, Vermont, and Virginia. Today marks the 75th or Diamond Anniversary of that first meeting. It also provides us with a golden opportunity to marshal our forces for the challenges of the 1980's.

And challenges there will be. To me one of the most intriguing aspects of measurement is that there is always something new; new phenomena to be quantified, new techniques for measuring, new demands for speed and accuracy. In the marketplace, price adds yet another element of urgency. With gasoline now running \$1.50 a gallon in some areas, and projected to further increases by year's end, the need for accuracy--and honesty--is even greater. While we can look back with pride on our achievements of the last 75 years, it is more important to look ahead with foresight and dedication at the challenges of the next decade. In my remarks this morning, I will comment on some of those challenges, and on actions that may influence the effectiveness of our weights and measures operations.

To start with, I believe the decision to broaden Conference membership is a very positive action. In the

past, membership consisted of weights and measures officials from States, counties, and cities of the United States.

Now, membership is open to anyone from this country, or from abroad, having an active interest in Conference activities and objectives. This change has doubled Conference membership, bringing in new faces, and new ideas, from scale manufacturers, service companies, and calibration labs, from packaging, food, and petroleum companies, and from abroad. The result will be a much stronger organization in which people involved with all phases of weights and measures can work together towards common goals.

I am particularly pleased by the fact that there is a substantial trend of people from other nations now participating in Conference affairs. I understand that our neighbors in Canada are exploring areas of common interest and possible joint programs with us. We will certainly benefit from the experience and unique perspectives of those in other nations. The end result may be smoother trading with partners around the world.

The extra revenues generated by increased membership will be used, in part, to expand Conference participation in the International Organization for Legal Metrology. This organization promotes worldwide measurement uniformity, much as you do within the United States, and it is important that U.S. positions be strongly represented in the OIML standards setting process.

OIML held its 6th International Conference in Washington last week. I had the honor to officially open this Conference, and Charles Vincent, Chairman of this Conference, was a member of the U.S. delegation. Many of the participants in the OIML meeting are in the audience today, and I extend to them a most hearty welcome.

A moment ago I mentioned measurement challenges in the years ahead. Many of them arise as a result of laws and regulations passed by all levels of government. In order to better focus our efforts, NBS has commissioned a study of the most pressing measurement needs of State and local government in the areas of weights and measures, health, environment, and resource recovery.

The study is being conducted by the Middlesex Research Center here in Washington, and will be completed in May of 1981. It is a broad ranging study that will assess such factors as the importance of a measurement, the economic, health, and safety consequences of not meeting

particular measurement needs, the state-of-the-art of the measurement, and the adequacy of current measurements. Also to be identified are equipment, operational, calibration, and institutional problems.

The end result of the study will be a separate listing of problems, in priority order, for each of the four areas I described earlier. In essence, the study will be used as a planning document. The list will help us, and you, concentrate on the most important problems in weights and measures.

Obviously, a study of this magnitude will require a great deal of input from weights and measures officials, and I invite your participation and cooperation. The data gathering will be done by the Bureau's Office of Weights and Measures, and will involve detailed input from five to ten States. The data will be submitted to the contractor for analysis and integration into the final report.

I believe this study is a unique opportunity to assess where we are, and where we need to go, in meeting measurement needs. The results can help all of us do a better job.

There is another study that I should mention, one specifically requested by Senator Cannon. He called on NBS, working with the State Conference of Radiation Control Directors, to assess major national measurement needs for radiation health and safety. In the case of ionizing radiation, closer coupling between NBS and the States who must make compliance measurements in their regulatory role, was identified as the top priority action. This is a direction in which we are headed, and the result should be more reliable measurements at the point of use.

I think the future will bring more complexity to State measurement needs in general and to weights and measures operations in particular. New measuring equipment, greater demands for accuracy, perhaps pressures for more frequent testing, will combine to challenge our metrological and organizational skills. A partial answer lies in training. Two universities are working with NBS in exploring interest in potential courses for metrologists. One of these is the University of Texas at Dallas, where a masters degree program in measurement science is being considered. The President of the University, Dr. Bryce Johnson, will present a look at measurement science education later this morning. I will merely add that a workshop will be held in Dallas in September to explore

the needs for this post graduate education in measurement science.

Another school in the Lone Star State--Texas A&M University--is also working with NBS to determine the needs for technical training for weights and measures officials through their extension service. Dr. Lee Phillips of Texas A&M is spending the week here to talk with you along these lines. They, too, are in a fact-finding stage, and will be holding a workshop next January at which you can present your views. There is a clear need for more effective training and education in the field of metrology, and we applaud the efforts of these two universities to explore the possibilities.

At NBS, our Weights and Measures Office is looking into the use of video tapes for training purposes. What they are considering is the production of tapes on particular aspects of measurement, and then making the tapes available to Conference members for use in your own facilities. Such an approach would greatly increase the audience we can reach, and reduce travel costs and time. The procedures for producing such tapes are now being explored, and you will be notified if we are able to go in this direction.

While it is not training as such, I would like to mention one related action in the field of publication. We have automated the production of Handbooks 44 and 130, the two most important NBS works in the weights and measures field. This means that revisions can be incorporated quickly, and distributed to all members of the Conference.

During the past year one of our oldest weights and measures programs was transferred to the Department of Agriculture. I am referring, of course, to the testing of railway track scales.

It was back in 1913 that our first scale test car rolled on the rails. With time out for wars and depression, the cars had been rolling ever since. Their main function was to regularly calibrate the 17 master scales maintained by railway companies, and as many as possible of the other 5200 scales around the country. Back in the 1940's we had eight people devoted to this program, but tighter funding and new responsibilities had cut that number to two in recent years.

Then Congress passed the Grain Standards Act in 1976. This Act gave the Federal Grain Inspection Service regulatory authority over 36 track scales used to weigh

grain for export. Rather than have them build new cars and, in essence, duplicate what we were doing, we struck a deal. We agreed to completely refurbish our two test cars, and transfer them over to the Grain Inspection Service. The two men who operated the cars, and who had been doing so for 20 years, also went to the Inspection Service. In return, the Inspection Service agreed to take on the responsibility of calibrating the 17 master scales operated by the railroads. I believe this is an entirely satisfactory arrangement, and the integrity of the measurements will be preserved.

Turning to improved measurement capabilities, I believe the measurement assurance program in mass, in which seven northeastern States are now active, is a major step in the right direction. Such programs give the participants a powerful means for establishing and monitoring their actual measurement performance. The fact that one lab acts as the group contact point with NBS minimized the amount of our involvement without in any way diluting the quality of our service. I encourage you all to consider the advantages of measurement assurance programs, and to work with us to help meet your needs.

Last month I had the privilege of visiting some of the measurement facilities in the People's Republic of China. While their philosophy and organizational approach is different, they, too, are concerned with equity in trade. It was agreed that next year a group from China will visit the USA and that about half of them will be regional inspectors. They specifically asked me to arrange for them to visit some of your facilities.

I brought back from China not only vivid impressions of a vast nation and a very hospitable people, but of an ancient saying as well. That saying is--"May you live in interesting times." I believe that all of us involved in measurement certainly do, and will continue to do so in this decade. The National Bureau of Standards will continue to work with you to ensure the times are not only interesting, but productive and satisfying as well, and that our Conference motto "that Equity may Prevail" continues to be realized.

COMMITTEE APPOINTMENTS BY DR. AMBLER

It is my privilege, as the President of the National Conference on Weights and Measures, to announce the appointment of individuals to serve on the Conference standing committees.

You are all aware how important the work and accomplishments of these committees are to the success of the Conference and to weights and measures administration and technology in the United States. In behalf of the Conference, I want to express my sincere appreciation to all committee members for their valuable contributions over the year.

To outgoing committee members we give special thanks for your service to the Conference, and to the new members who are taking on this vital responsibility we offer our best wishes for an enjoyable and rewarding experience.

The appointments to committees are as follows:

COMMITTEE ON SPECIFICATIONS AND TOLERANCES

Mr. Darrell A. Guensler, Assistant Chief, Division of Measurement Standards, California Department of Agriculture, is reappointed for a 5-year term. Mr. Guensler was previously appointed to fill the unexpired term held by Mr. Council Wooten, State of Florida, who retired.

COMMITTEE ON LAWS AND REGULATIONS

Mr. Edward P. Skluzacek, Director, Division of Weights and Measures, Minnesota Department of Public Service, is appointed for a 5-year term to replace Mr. Robert W. Probst, State of Wisconsin, whose term is expiring.

COMMITTEE ON EDUCATION, ADMINISTRATION, AND CONSUMER AFFAIRS

Mr. Thomas F. Geiler, Sealer, Department of Weights and Measures, Barnstable, Massachusetts, is appointed for a 5-year term to replace Mr. Anthony J. Ladd, Akron, Ohio, whose term is expiring. I wish to note that Mr. Ladd retired on June 1 after 34 years of weights and measures service with the City of Akron.

COMMITTEE ON LIAISON

Mr. Kendrick J. Simula, Administrator, Division of Weights and Measures, Oregon Department of Agriculture, is appointed for a 5-year term to replace Dr. Charles H. Greene, State of New Mexico, whose term is expiring.

Again best wishes to all for the year ahead!

PRESENTATION OF HONOR AWARDS

Dr. Ambler presented Honor Awards to members of the Conference who, by attending the 64th Conference in 1979, reached one of the attendance categories for which recognition is made--attendance at 10, 15, 20, or 25 meetings.

Award Recipients

25 Years

Robert W. Foster	Single Service Institute
Richard N. Smith	National Bureau of Standards
Harold F. Wollin	Executive Secretary, National Bureau of Standards

20 Years

Blayne C. Keysar	(posthumous) National Bureau of Standards
Marion L. Kinlaw	Retired, State of North Carolina
George S. Franks	Cumberland County, New Jersey
Charles H. Oakley	U.S. Department of Agriculture

15 Years

Trafford F. Brink	State of Vermont
Richard Southers	American Petroleum Institute
Eric A. Vadelund	National Bureau of Standards
Sam F. Valtri	City of Philadelphia, Pennsylvania
Otto K. Warnlof	National Bureau of Standards

10 Years

Joseph F. Devitt	Lockheed Electronics
Allen J. Farrar	National Bureau of Standards
David P. Leahy	The Kroger Company
Kendrick J. Simila	State of Oregon
Tony Zeller	Presto Products

Certificates of Appreciation

The Certificates were presented by Charles H. Vincent, Conference Chairman, to the following:

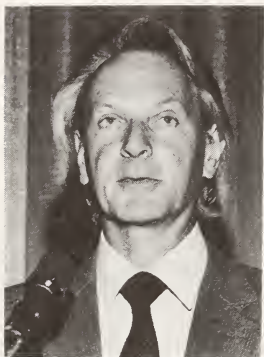
John H. Lewis	State of Washington, Conference Chaplain
George L. Johnson	State of Kentucky (retired)
James F. Lyles	State of Virginia, NCWM Represen- tative to OIML
A. J. van Male	The Netherlands (OIML President)

Anthony J. Ladd	Akron, Ohio (retired), Committee Chairman
Charles H. Greene	State of New Mexico, Committee Chairman
Robert W. Probst	State of Wisconsin, Committee Chairman

SOCIETAL AND TECHNOLOGICAL DEMANDS UPON LEGAL METROLOGY -
A STRATEGY FOR MEETING INCREASED NATIONAL AND
INTERNATIONAL NEEDS.

Presented by KNUT BIRKELAND, Director,
Norwegian National Service of Legal Metrology

INTRODUCTION, HISTORICAL DEVELOPMENT



Mr. President, Mr. Chairman, distinguished officers and members, ladies and gentlemen - This is a great honor and privilege for me, both as the head of the metrological service in a small but highly industrialized European country and as the President of the International Committee of Legal Metrology, to address the National Conference on Weights and Measures now on the footsteps of the eighties.

I am grateful for this opportunity to tell the Conference how OIML looks upon the challenge of the eighties, and I hope by doing so that I can contribute to strengthening the already good relations between the Conference and OIML. And, at this point, I would also like to use the opportunity, on behalf of the International Organization of Legal Metrology, to express my profound gratitude for your invitation to the OIML delegates to attend this Conference, for the possibility to exchange views and knowledge, and to establish friendship, all of which I consider most important.

I will try to tell you about some of the societal and technological demands of the eighties as seen in an international/global perspective and I shall try to suggest more strategies to meet the needs. Obviously, half an hour is a little short to go into very great detail, but I will try to focus on a few of the most important demands and strategies.

Measurement, of course, is a very ancient activity. It was probably born the minute food had to be shared. Legal metrology was born the minute that ancient king realized that he wanted to tax trade to get what he considered to be his fair share of good living as well as the money to pay the little army he needed to secure long life and continuity of the good living.

So, regardless of how old we claim our profession to be, it may not always have served only the noblest of

purpose, equity in and beyond the marketplace. It is the same now and will be in the eighties. Legal metrology must always work to keep its integrity and to stand up against pressure to serve irrelevant purposes such as protectionism, trade barriers, etc., instead of its real purpose, securing accurate measurement.

Development in metrology has come in steps. In particular, industrial development has been responsible for this. Until the last century every nobleman or every county proved its integrity by having its own system of legal metrology, including units and the lot. Of course, this met the needs as long as worldwide trade and industrial production was at a minimum and the local activities dominant.

During the 19th century this changed drastically. Clear-sighted men realized that no nation could have an economy independent of trade with other nations. The metrological chaos was however evident for everybody to see at the big world trade fairs of the middle of the century. The confusion was complete and judgment and comparison prohibited, since all goods from different parts of the world were measured in different and incongruent measures and units.

METER TREATY

Consequently, this led to the creation of the oldest scientific, international treaty, the meter treaty in 1875, which is perhaps the most significant event in metrology. It rapidly inspired a high degree of uniformity as well as the creation of important national metrological institutions of which NBS is such an outstanding example.

Further technological development however led to renewed confusion, now in the field of measuring instruments. To satisfy the market, the manufacturer had to produce a hundred different versions of an instrument. And legal metrology went along with this ridiculous development, even amplified it by producing local regulations and requirements, incompatible with those of other nations.

OIML TREATY

To help solve this difficulty, to give legal metrology the tool to work with, the International Organization of Legal Metrology, OIML, was created by an international treaty in 1955. The creation of a global, as opposed to local or even regional organization, to deal in cooperation

and harmony with these problems, was the second significant step in metrology.

I have spent much time looking into this, because it is evident that technical development also has an adverse effect on the process of creating and maintaining uniformity in legal metrology. Twice this has been successfully handled, but that has been in a situation where the development was slow as compared to the rate of change now. We must definitely be aware of the danger that fast growing technological complexity will tempt legal metrology to look for all sorts of local, improvised solutions to the detriment of rational solutions based on worldwide cooperation and expertise. I will come back to this later.

WHAT IS LEGAL METROLOGY

Having said this, it is now time to look at what legal metrology really is. By definition it is that part of metrology which deals with units of measurement, methods of measurement, and measuring instruments in relation to the mandatory technical and legal requirements that have the object of ensuring a public guarantee from the point of view of the security and of the appropriate accuracy of measurements. This of course leaves the responsibilities of legal metrology wide open to various legislative and administrative practices in the different countries, ranging from classical equity in the marketplace to securing accurate measurement in every field of human activity.

SOCIETAL DEMANDS ON LEGAL METROLOGY

Now, what are the societal demands on legal metrology. A lot could be said about this, all of which could be condensed into two controversial demands: increased activities - for less cost, and increased responsibilities - without restrictions. In short society wants to keep its cake and eat it.

What it means is that we cannot be satisfied being good metrologists; we must also be better than our competitors, justifying cost-benefit, fighting for funds. This is a challenge to be taken more seriously in the eighties than ever before. What it also means, the symptoms being more public guarantee with less legal requirements, is that the demand upon legal metrology is to find balanced, and above all, metrologically sound solutions.

INCREASED ACTIVITIES

By increased activities I am not so much thinking of the increasing number of instruments to be verified. That is the least significant change, and straightforward to tackle. I am thinking of much more profound changes that perhaps are more difficult to recognize as having vital importance to legal metrology since many of us like to be biased by tradition.

Traditionally legal metrology's concept of trade was very much focused on the marketplace. This was the case when the meter treaty was created, when NCWM and even when OIML were founded. The concept of trade has however gradually developed, and now this catches up to legal metrology.

Important commercial transactions nowadays frequently include, and for obvious technological reasons, reference to quality control as well as certification of quality in a sense that can only be verified by metrology, by measurements with qualified traceability to standards. Legal and commercial implications are the consequence of requirements not met. The contract, the survival of a factory, employment might be at stake. This is trade just as much as is the marketplace. And because of its apparent legal as well as metrological implications, society already demands involvement from legal metrology. For what is quality except what you can quantify by measurement, certified and traceable, which is what legal metrology is all about. It might just happen that because of the economical importance in the area of quality control and certification of quality, priority might shift from traditional to less traditional areas of activities in the eighties.

Let me add that some countries have had a better opportunity than others to deal with this demand within the scope of legal metrology. However, I am convinced that the eighties will present the challenge to legal metrology in the most profound way, which is: help solve the quality control and certification problems of the industry or stagnate. But in the eighties society will put demands on legal metrology not only for reasons of economy and trade. Quite different aspects come into focus as well. They are all consequences of scientific and industrial development. I am thinking of environment, safety, medical instrumentation. Industry develops pollution, society tries to protect itself by legislation and measurement, and there you are, legal metrology again. It might not concern all of us directly today. But in most countries there are people and institutions

concerned, and as soon as their metrology becomes sophisticated enough, they will have to prove their accuracy, and this at least demands involvement, cooperation, and coordination, as well as increased responsibilities upon legal metrology.

What about safety, where legislation exists and where measurement is the criterion. This area covers a lot; police radar, crane safety force meters, verification of manometers for pressure vessels, weighing of aircraft to conform with Air Navigation Orders - you name it. Society demands it from legal metrology.

Last, but not least, medical science has developed a high degree of sophistication. The complexity of instrumentation for diagnosis and treatment is impressive and increasing.

There are demands for verification, and proven accuracy within prescribed limits, all of which point to legal metrology as the target when society makes its demands. And society is going to demand just that. I am even convinced that the eighties will present us with an eruptive development of society's demand on legal metrology in this field. In sum, society will demand that the old trunk of legal metrology grow new, strong branches, some of them perhaps brand new, others perhaps transplanted from others. For this country in particular, the eighties are going to present a special demand, metrication, however controversial and loaded with feelings it may be. I am sure you are well aware of the challenge, and I shall look forward to the day when you have completed this enormous task with success, which literally will mean a metrologically united world.

TECHNOLOGICAL DEMANDS

Now I will turn my attention to the demands upon legal metrology from the complexity and sophistication of the technology of the eighties. It is certainly going to change our concept of the purpose of legal metrology. For many the main purpose has been to prevent fraud, next to assure accurate measurement.

The complexity of tomorrow's instruments may make it too difficult, risky, and time consuming to manipulate them for fraud. On the other hand the same complexity might increase the probability of unintentional inaccuracy of measurement by instrument or component failure. But this means that equity in the marketplace will demand more attention to assure accuracy and less to fraud.

Another example of shift of emphasis is brought to legal metrology by the microprocessor and its relatives. So far the microprocessor has presented us with increased difficulties in verification and pattern approval. I can assure you that not only is it going to become much worse before legal metrology comes to grip with it; it is also going to change our very basic concept, that the criterion of a good instrument is linearity.

It is very deeply rooted in every metrologist that linearity is basic; the linear range of the instrument is the legal range, regardless what kind of instrument we are talking about. But the properly programmed microprocessor can straighten out any lack of linearity - if there is not another parameter not programmed for and the parameters keep within the range of the program, and if humidity does not shortcircuit the processor, etc., etc. In short, we can forget about the linearity of the instrument as such. Fine, so will the manufacturer as well. He will ask himself, why spend \$1000 dollars on this high quality pick-up when 10 bucks worth of microprocessor can straighten up \$100 worth of pick-up. Not so fine for legal metrology, for this cheap pick-up will be sensitive to a lot of influences and parameters and lack of repeatability and will bring us no end of extra trouble.

The microprocessor will demand a shift of attention from linearity to a more global concept of instrument performance. On the other hand the microprocessor will help significantly in solving other problems such as storing and telecommunicating information. How conveniently will the local inspector in the middle and late eighties be able to get all the information he needs for a complicated in situ verification just by reading his online or offline terminal screen. And how easily will he be able to feed back to headquarters all relevant information.

However, technology has more demands in store. Legal metrology will be facing a large range of more or less new sources of measuring errors. Surely we are used to temperature effects, but perhaps not all of us so much to humidity effects. And what about electrical noise and electromagnetic interference or even radiation. These will be the demands of the eighties.

A completely different kind of technical demand will be presented by Standard Reference Materials, SRM's. They have quickly gained an increasingly important place in metrology and are being integrated into legal metrology, the objective again being equity beyond the marketplace.

THE THIRD WORLD AND TECHNOLOGICAL DEVELOPMENT

Impossible to predict, it may well come to affect legal metrology more than anything I have already said. We can always ask ourselves to what extent legal metrology in the developing countries can meet their needs or to what extent other countries can help. Unless a significant effort is made by legal metrology, I am afraid the prospects are a little less than bright.

However, the most important demand upon legal metrology that technology presents is brought about simply by the accelerating rate of change of technology. I shall only remind you how the introduction of electronics nearly paralyzed parts of legal metrology. We wanted to see how the thing developed, wanted the situation to mature and settle. Then and not before, would we deal with it. Of course that is a cautious and reasonable approach based on previous experience where the same method had been applied with perfect justification and great success, such as when the scale based on the double pendulum came in the first third part of this century. That contraption was not allowed into the world of legal metrology until it had reached a metrological perfection that made it equal to scales and balances already in existence, which was a stimulating challenge to the manufacturers. No such luck this time with electronics. The only but significant difference now, making all previous experience obsolete, is basically the rate of change. Whereas our predecessors could let a new development reach its final stage and then deal with it, there is no time for that today. We must provide a solution for technical development before the development defeats us. We do not want to be in the position in which we have to tailor the requirements to the instruments instead of having the instruments tailored to the performance criteria, nor do we want to be thrown into the limbo of not being able to provide any requirements and criteria, as is the sad case in many countries when it comes to electronics.

This technological demand on legal metrology relates to rate of change, i.e., that yesterday's instruments are obsolete today and we have only little knowledge about what will be the technological reality of legal metrology of tomorrow.

STRATEGY FOR MEETING NEEDS

I believe the following presentation will suggest that the strategy for meeting many International needs is to start working at it on a National level, just like strategy for National needs starts on the International

level. I would therefore rather like to distinguish between specific needs and general needs.

PERFORMANCE NOT DESIGN

Is there for instance any strategy to deal with the need to avoid being defeated by rate of change, by the fact that we know little at present of tomorrow's instrumentation, whereas today's will soon be obsolete. Oh yes there is. The obvious strategy is that all kinds of requirements be written in terms of performance and not of design or construction. Needless to say, this basic strategy has already been agreed upon as a guideline for the elaboration of OIML recommendations. But it is hardly sufficient to leave it at that; all must remind themselves of this strategy whenever elaborating regulations. It is so easy to slip into design criteria and as a consequence be defeated by rate of change, and it takes a lot of courage and knowledge to concentrate on performance-regardless of technical solutions.

FROM INSTRUMENT TO MEASUREMENT RESULT

Is there a strategy to deal with increasing technical complexity on the verification level, the need arising partly from technical development and partly from new areas of interest for legal metrology. There are several, I believe, of which the following might be the most important. The strategy actually implies that legal metrology needs to accept a wider concept of responsibility than the traditional one, and this is no contradiction. Legal metrology will gradually change or rather widen the emphasize from instrument to measurement result. Accurate measurement is what we want. It might have been the sufficient condition to make certain that the instrument was correct. This might no longer be so in all cases, although it still will remain the basic, if not the sufficient condition, that the instrument is right. No one can measure accurately with an erroneous instrument. The strategy will be to start shifting attention to the accuracy of the measurement result, and start looking into how we may start putting that into practice during the eighties.

COOPERATION-NATIONAL AND INTERNATIONAL

There is however one strategy, more complex and difficult but more efficient and rewarding, that will prove increasingly important through the eighties, and the keyword is cooperation. Now, that may mean everything - or nothing. What will it mean for legal metrology? One way of putting it is to say that it is obvious that

increasing technological complexities will mean an openness and willingness to greatly increase crossprofessional cooperation and coordination of resources. Another way of saying the same thing is to point at the importance of working actively to establish credibility and create confidence. Friction reduces and slows down cooperation; confidence is the oil that reduces friction. However evident the need for cooperation, it cannot exist without confidence.

Let us look at a practical, down to earth example. Let us assume a bottleneck in the system. It could be anything, but this bottleneck is caused by lack of willingness to cooperate, insistence on doing it myself, ourselves, because only then will we know it to be O.K. Now, society has a tendency of getting rid of bottlenecks, one way or other, so it might be wiser to beat it than to be beaten by it. If the bottleneck is, say, pattern approval or initial verification, it could be resolved by sharing work with somebody, avoiding double work; i.e., letting somebody else, another country for instance, do your work. Now, this is not at all that easy, because I do not know the competence of this other service nor the quality of its work. The obvious answer is rejection, I better do it myself, then I will be sure. There is only one flaw in this reasoning; it gives the wrong answer. The right and logical answer is, if you do not know, get to know. Get knowledge about competence and quality. When you know, not before, you can decide. Decision must be based on knowledge, not on lack of knowledge.

This, of course, means a systematic, active effort to establish credibility and create mutual confidence. This is a road of vital importance and we must not underestimate the difficulties. I am convinced that the means must be pragmatic and in steps. It will hardly be possible to achieve anything by declaring that everything that is accepted by country A also goes in country B; the latter will never be happy. But it might be possible for B to accept, for a start, that if A declares it has verified an instrument, and accepted it as conforming to specified requirements, this leaves it open to B to check or not.

During the process A will build up credibility and B will get confidence. Similar examples could be given to cover the range of activities of legal metrology. The answer will always be, cooperation must be founded on confidence, based on knowledge. Having thus the key to useful cooperation, it is fair to state that this is the strategy of ultimate importance to meet the needs.

Another practical example refers to one of the controversial demands of society, increased activities - for less cost.

Legal metrology is being generously charged with new activities and responsibilities, but is, I dare say, rather less generously supplied with adequate resources to do the job. Now, how can one execute full responsibility without having enough people and funds to do the job. Let us look for a moment at what NBS and other national laboratories did when they realized that they could no longer do all the calibration work that was required. They left a lot of calibration work to other laboratories, in particular the less demanding work. In some cases this happened after a process of accreditation. However, the national laboratories maintain their responsibility by means of traceability, systems of supervision, and above all, maintained competence and knowledge.

Could legal metrology develop something similar to ease the problem. One has to bear in mind the particular quality of the responsibility of legal metrology, which is unique. Legal metrology does the job on behalf of the government. The actions have legal consequence and validity. It follows that delegation of work is no simple, straightforward matter that can be based on the single criterion of know-how.

However, I feel convinced that legal metrology will have to develop and use new ways to execute the responsibilities. One way will no doubt be based on increased inter-institutional and similar collaboration on a national or state scale.

As the main problem is associated with new activities and responsibilities, the strategy to meet the needs will be to develop watertight systems of supervision rather than to try to undertake all of the field work, as such. This is where the collaboration comes in to cover the need. The strategy is, however, entirely dependent on legal metrology's ability to develop and maintain knowledge. No one can collaborate without knowledge, nobody can supervise without deeper and more comprehensive knowledge. Accordingly, the key words of the strategy are supervision and knowledge. This means increased cooperative activity, a field where NCWM has such a fine tradition, making NCWM an obvious cornerstone in this job. Another cornerstone will of course be OIML, younger than NCWM, but also strong and willing.

EDUCATION-KNOWLEDGE

The next strategy will be to encourage metrological education, to establish knowledge on all levels, throughout the world, education and training. The best investment is to keep abreast of technological development. I would like to add here that some of the activities of cooperating and coordination of resources have a very strong educational spin off effect indeed.

I am thinking of increased intercomparison of standards - very educational. Development of internationally standardized methods for testing and verification of instruments and measurement procedures, particularly relating to pattern approval and initial verification, is very educational. So will be co-work for the purpose of rationalizing methods for subsequent in situ verification.

INTEGRITY

Through all this legal metrology will have to keep, perhaps even strengthen its integrity. Without integrity, no credibility.

CONCLUSION

I feel convinced that legal metrology faces a highly difficult, as well as highly interesting and challenging immediate future. Technology races at a rate that forces us to rethink and change ideas, methods, and concepts. Society is going to ask much more and in new fields. We might risk being defeated, but united through strong and frictionless cooperation and effort we will be able to meet the needs, and to serve society adequately.

However we are all, you as well as I, responsible for whether or not we are going to succeed. This is why I am so grateful for this opportunity to address you. Like NCWM, OIML will only be effective if we contribute to its inputs and make use of its outputs.

I am glad to be able to say that the contribution of your country to the work of OIML has already been significant and will be even more so in the future. Your resourceful country has so much to offer and on the other hand, such an enormous capacity for making use of the output.

SHARING POWER, RESPONSIBILITY, AND RESOURCES
IN THE FEDERAL SYSTEM

Presented by WILLIAM J. PAGE, JR., Executive Director
The Council of State Governments



It gives me genuine pleasure to join you for a portion of the 65th National Conference on Weights and Measures. I was surprised when I received the invitation from Harold Wollin, your able Executive Secretary. I knew that he wanted the Secretary of Commerce for this spot on your agenda. My sympathy for Harold increased when I reflected on the difficulty of his task. The truth is that I am the only person Harold could find who is not preoccupied with running for, or from, a political situation this year.

Government is an increasing part of the total experience of life in the United States. Approximately one-third of our national product is governmental activities. Our governments employ approximately 13 million persons or about six percent of the total population. Clearly, government is the most extensive and pervasive element of our national experience.

Size alone is not an adequate index to governmental activity. Our 80 000 Federal, State, local, and other types of governmental jurisdictions defy comprehension, appropriate planning and coordination, and accountability. Size, complexity, and trends require attention of elected officials who value a responsible partnership. Continual learning is required to understand trends and current situation, for anticipation of future problems, and for intelligent initiatives to assure appropriate governance of the entire system of public services.

My remarks today will cover trends of special interest to States, issues of integrity in the Federal system, financial responsibilities and patterns, and problems and opportunities in the probable future of our Federal system. Having invested my life in intergovernmental affairs since I was old enough to vote, I feel free to celebrate the good and to slam the deficiencies of our system. Also, I feel entitled to a few opinions.

TRENDS: ISSUES OF INTEGRITY IN THE FEDERAL SYSTEM

Three trends are particularly important to elected State officials. The first notable trend is general and rapid expansion of governmental activity. The second trend is the increasing level and shifting pattern of intergovernmental finance. The third trend is increasing centralization and control by the Federal government. These three trends are closely related.

The expansion of government may be measured in scope of governmental activities at various times, in dollar costs, and in employment. I have mentioned one index of scope: one dollar in three of our Gross National Product is government. The next selected index is approximately 500 federal assistance programs, most of them enacted during the past two decades. The most amazing change in these intergovernmental programs is not in number or size. Instead, it is in the bewildering variety of persons, groups, and organizations eligible for specialized financial assistance, most of whom are organized as special interest groups. As I will mention later, the diffused availability of funds makes real accountability nearly impossible and actually stimulates the creation of single-purpose districts and other governmental fragments.

We have reached the stage where our willingness and ability to create governmental activities has outstripped our ability to govern them.

The second trend, increasing financial demands of intergovernmental programs, will be addressed in a later section of my remarks. Today we address this trend with increasing awareness that the intergovernmental financial barrel does have a bottom in it -- placed there by a declining economic growth rate and increasing numbers of taxpayers who feel overburdened with taxes.

The third trend, increased centralization and control, was aptly labeled by the Advisory Commission on Intergovernmental Relations. The Commission called it "a tilt toward Washington." This trend is closely related to the flow of funds. The Golden Rule, government style, is: "He who has the gold makes the rules." But centralization and control are not limited to the flow of money. There is an increasing tendency of Federal legislators and bureaucrats to mandate actions by State and local governments, regardless of financial support. States sometime show this same tendency toward local governments. Other mandates have proliferated in contractual agreements between Federal grantors and their State and local grantees.

They have been added to formula grants based on State entitlements and they abound in discretionary project grants. These mandates are reinforced by regulations, which have the force and effect of law. Today, we have approximately 100 Federal agencies producing 7000 regulations per year. More than 50 of these agencies do business with the States. The regulations conflict, one with another, and with State laws. Here is probably the messiest situation and one of the knottiest problems facing State government now and in the future.

The present situation raises serious questions whether our capacity to govern has kept pace with the expansion of governmental activities. This issue is a current study topic of the National Academy for Public Administration, among others. The Council of State Governments, I am happy to say, has begun work on several dimensions of this problem, in regional organizations and nationally. So have the Congress, the Executive Office of the President, and the private sector.

FINANCING AND MANAGING THE FEDERAL SYSTEM

Growth of intergovernmental finance during the past twenty years exceeded the total growth of the first 175 years of our nation's history. The evidence supports Al Toffler's thesis of an exponential rate of change.

Trends show changes in the relative and absolute financial roles of State and local governments in the United States. State and local governments raised 33 percent of all public revenues in 1957. Twenty years later, they raised 42 percent. The major gain in State revenues occurred through increases in sales and income taxes. Service demands require more workers. In 1977, more than 82 percent of all civilian employees of public organizations worked for State and local governments.

The States have become the financial managers of the intergovernmental system. We are the middlemen although the Federal and local governments constantly aspire to go further into direct business between themselves. They apparently wish to forget that the Constitution provides two tiers, not three. Direct Federal-local financial assistance has increased about twenty-fold in the past two decades. To the extent that direct Federal-local financing and mandatory pass-throughs occur, to that same extent the decline of State-local aid should be expected. For example, if the General Revenue Sharing Act is changed this year to provide a larger share to, or only for, local governments, the States undoubtedly will reduce the proportion and amount of State funds now allocated to

local governments. If the States are cut out of the General Revenue Sharing program, their incentive and their fiscal capability to assist local governments will be greatly reduced, especially in public education.

Another trend of the past twenty years is upward shifting of costlier public services. Education and welfare are examples. Many States have assumed all or increased shares of the cost of education, while the Federal share of total support has increased only seven percent. In welfare, the share of total program costs from Federal sources has declined three percent, while 30 States have assumed ninety percent or more of welfare costs. As the local tax base shrinks, the burden on State governments will increase. Direct Federal-local aid will reduce the demonstrated tendency and incentive of State governments to assume such costs.

The States have shown greater fiscal effort than either Federal or local governments. In constant dollars, States produced a 360 percent increase in revenues during the period 1957-1977, while the Federal increase was only 170 percent and the local increase was 270 percent. During this same period a six-fold increase in Federal-State grants occurred while direct Federal-local grants increased nearly 19-fold.

This massive increase in direct Federal-local aid has changed the whole character of intergovernmental finance, making local governments much more dependent on Federal aid. Local governments in 1977 received over 75 cents in State and Federal aid for every dollar raised from local sources. This represents more than doubled local fiscal dependency since 1942. Our local governments have become "grant-in-aid junkies." States are losing the battle to help local governments control their fiscal habits because the Federal pushers are on every street corner!

I am afraid that we and the "feds" too frequently forget that States provided \$61 billion in aid to localities in 1977, which was the year in which Federal grants-in-aid began to level off. With the current slow-down in Federal aid -- actually a decline in real dollars -- we can expect the State burden to increase, unless we correct our course of the past two decades.

States have made substantial progress in improving their own financial systems. Their revenue instruments are now more balanced and responsive to economic conditions. They are less regressive. Homeowners are shielded from property tax overloads in 29 states. Thirty-seven States

now use the two most powerful revenue devices, income and sales taxes, compared to 18 States in 1950.

States carry a larger share of the taxation load. For example, in 1963 we raised \$1 for each dollar of revenue produced by local governments; in 1978 we produced about \$1.40 for each dollar collected locally.

The General Accounting Office studied the financial prospects of a sample of nine states in 1979. The financial outlook in these states was good to excellent, even when inflation and tax and expenditure limitations were taken into account. California's prospects were an exception to the general pattern but this State's prospects were dramatically improved on June 3. The taxpayers voted two to one against a measure to reduce state income taxes by 50 percent. I see this action by voters as a restoration of balance in financial support of public services.

We now need to face the fact that some of our objectives are different from the objectives of the Federal government. Not all national goals have high priority for State and local governments. As responsible financial participants, we must begin to choose what we will and will not support with State and local dollars.

Whatever else the decade of the 1980s may hold, vastly improved policy management and higher expectations of productivity will become absolute necessities. We can no longer afford to invent new programs or expand old ones and continually employ additional staff in response to every known need or pressure from special interests. Governmental revenue projections will not support the expansive pattern of the 1960s and 1970s. Heavily burdened taxpayers will not allow it. Simply stated, we shall have to accomplish goals in some order of priority with greater resource limitations.

Hard choices can be made intelligently through the discipline of policy management, which can help to establish goals at each level of government, consider alternative strategies for achieving such goals, measure progress, and evaluate outcomes. This discipline will have the comfortability of a hair shirt for many policymakers, administrators, and specialized professionals. For example, in human services, the area in which I have spent a major portion of my time, activity counts frequently are substituted for evaluation of outcomes. In other words, we do a lot of "good things" for people but we do not satisfactorily answer the question: "What difference does it make?" This issue becomes terribly important when one realizes that States spend one-half of their

total dollars in human services. Actual savings are less likely than improved productivity, which is just now being discovered as a possible way of coping with increased demands for services, fiscal constraints, and inflation.

I am confident that careful prioritization and emphasis on productivity gains in the public sector will become a part of our way of life in the 1980s. A recent study by the Academy for Contemporary Problems reveals that almost one-third of all current capital investment in the United States is being non-productively diverted to finance the costs of delay. This is a major reason for increased inflation and productivity losses. Too much of this delay is caused by governmental regulation and slow decision-making.

PROBLEMS AND OPPORTUNITIES FOR STATES

As we attempt to cope with intergovernmental problems, we need to be constantly aware of our opportunities. Sometimes they are the same.

A contributing cause of excesses in costs of public services is the number of governmental units. We have thousands of unnecessary and inefficient units of government -- tiny municipalities and single-purpose jurisdictions. Many of these limited jurisdictions have been established solely to qualify for Federal or State funds. Once established, they are forever in fiscal need. It may be incredible to you, but we actually have 37 units of government per 100 000 population! The total count is nearly 80 000 units of government. One in four (21 000) does not even have one full-time employee; 11 000 of these small or fractional governmental entities receive General Revenue Sharing checks from Uncle Sam.

Here is a problem which the States must handle more effectively if the costs of government in the United States are ever to be controlled. And it is a State problem. One thing that the Congress or the White House cannot do directly is create a local government.

State priorities clearly are different in some instances from Federal emphases. When one subtracts the direct Federal pass-through from total state aids to local governments, two facts stand out clearly. First, State financial emphasis is placed on education and general aid to local governments. Federal aids consistently place more emphasis on welfare and highways. Federal aid to education has never exceeded ten percent of the total cost of this function.

In addition to too many governments, a State perspective of the Federal system today reveals too many controls. The overall problem here is attributable to the mistaken notion that control of process, or procedures, assures desired outcomes and accountability. Even if process control could guarantee outcomes, a further problem is that many of the intergovernmental programs do not specify the outcomes to be achieved. The overall result is a tangle of regulations that is impossible to manage and bales of statistical data that are useless for executive management or policymaking.

State hands are not entirely clean in this matter of futile efforts to control intergovernmental programs. Our first fault is that we do not frequently and vigorously challenge inane or excessive controls. We could win more issues if we made more issues.

The second problem in our effort to control process is that we relay all of the Federal procedural controls as we pass resources through to local governments. Too frequently, we even add a few for good measure. The end result is that local administrators cannot do an honest day's work without violating some of these regulations. If we continue in this pattern, we will breed contempt for all efforts to get proper control and accountability.

"Proper control" means to me assurance of outcomes that are understood and accepted by all persons involved in an operation. This requires that we let our public employees know what we want as products or outcomes of their work. Accountability also should be expressed in these terms. Certainly we expect, and usually get, fiscal integrity. Public employees, in my experience, rarely steal or deliberately misuse money. A more frequent problem is that they work hard but accomplish very little--because no one has specified what they are expected to accomplish.

A great opportunity for the States may be even more difficult to achieve than productivity of administrative agencies. We might stop onerous mandates and proliferation of fragmented programs at the source if we can develop effective intergovernmental legislative relations. There was a time when we could rightly blame the President and the executive branch for many increments of programs. Now credit is more correctly given to the Congress for such initiatives. Presidential and Congressional initiatives are likely to be stifled by the projected economic situation expected in the next decade.

Executive relations in intergovernmental affairs have been fairly well developed for a long time. It is not unusual for a President, as Jimmy Carter has done frequently, to invite State and local officials to the White House to discuss policy matters. State legislators, governors, mayors, and county officials have had ready access to the President in recent years.

The big gap that remains is the absence of an effective overall relation of the Congress and State legislatures. Current efforts of the National Conference of State Legislatures and the Council of State Governments are not sufficiently extensive and not appropriately designed to achieve this objective. Elected State officials must be willing to find the time and adopt different methods to make federalism work.

I have not yet referred specifically to the major public policy issue facing the United States today. I refer, of course, to development of ample and reliable sources of energy to meet our future needs. On this issue the States must be as concerned and involved as the Federal establishment.

My immediate concern is that the trend toward Federal centralization will cause Federal and State policymakers to assume that the Federal government should handle the energy problem alone. If States permit this to happen we will have failed to engage effectively with the most critical and pervasive problem of our time. The supply and cost of energy are critically important to every citizen of the United States. Elected and appointed officials must insist on, and handle responsibly, a significant portion of public policymaking and execution. We are lagging behind the action at this time.

Natural resources is another area where we need to assert ourselves. The intelligent use of land, water, and mineral resources is closely related to our energy and economic futures. It may be more difficult in some ways and easier in other ways to get sensible policy established through heavy State involvement. Hard or easy, I do not believe that we have a responsible alternative.

CONCLUSIONS

Though the increasing size of the public sector is impressive, the complexity of policy choices and administration are probably even more significant for the 1980s. The Federal system has become overburdened because nearly all governmental functions are shared by national, State,

and local governments. The current and prospective situations raise issues of our capacity to govern the intergovernmental system created during nearly a half-century of expansion.

The States have become the fiscal intermediaries for the intergovernmental financial system. Their own contributions are an absolutely and relatively increasing portion of intergovernmental resources.

Excessive reliance on regulation has been costly in terms of productivity and attitudes toward government. All levels of government have fallen into the trap of regulating process rather than outcomes. This generic issue is now receiving national, State, and local government attention.

Fiscal stringency is and will continue to be a strong motivator of improved policy management and initiatives to improve productivity. Legislative oversight is expected to increase.

Incremental change rather than constitutional or other radical revision is the most probable prospect for the Federal system of government in the United States. Though the system appears to be overburdened, it has produced and continues to produce direct or indirect benefits for a majority of persons in the United States.

A UNIVERSITY LOOKS AT MEASUREMENT SCIENCE EDUCATION

Presented by BRYCE JORDAN, President
The University of Texas at Dallas



It is a pleasure to be with you this morning. I confess to a sense of anxiety in speaking to an audience of professionals about whose subject I know practically next to nothing. It does give me some comfort that your fine Conference Chairman, Mr. Charles Vincent, is a fellow Texan and Dallasite. Also, it gives me some relief to recognize that while I know little about measurement sciences, you in turn probably know little about the University of Texas at Dallas.

Let me say just a brief word about UTD. Formerly the Southwest Center for Advanced Studies, the University was created in 1969 by an act of the Texas legislature as a component part of the University of Texas system. UTD is an upper level institution, without freshmen and sophomores. Nearly half of the student body of 6000 is at the graduate level, enrolled in one of our 10 Ph.D., or 16 Master programs. The University has a tradition growing out of the natural sciences and continues to place a strong emphasis on graduate instruction and research in the natural sciences. Indeed, in terms of per capita faculty research funding, UTD ranks second among all of the public colleges and universities of the State. I emphasize these points by way of saying that UTD possesses most of the resources that might be required to train measurement scientists.

In speaking to the subject of "a university looks at measurement science education," I want you to know that UTD has been considering this subject for about a year. Our University was first made aware of the need for measurement science education about one year ago. A fellow Texan from Dallas, Sy Raskin--whom many of you know--initiated our discussion based on industrial users' needs for education and research. Coincidentally, the National Bureau of Standards was investigating better means for education and training of Bureau personnel, or State regulatory personnel, and others engaged in development, inspection, service, and operation, relative to the measurement function. We were one of a sample of universities across the Nation contacted regarding potential

solutions to needs for education and training. It is a step in this progression of activities that leads me to speak to you today.

As a layman, I can understand that measurements of physical quantities are important technologically, economically, and socially. I am told that timely and precise measurements are a source of improving operations in fields as diverse as steel-making and medical care. Also, the economic fairness of commercial transactions depends on correct measurements. Environmental protection relies upon measurement of physical quantities. The planning, organizing, and controlling of processes by managers requires measurement of performance in relation to operating goals.

Since measurement science apparently has such a potentially broad scope of influence on our Nation's productivity and the quality of life, the education of measurement scientists should be of considerable potential interest.

As an educator responsible for the conduct of a new major public university, the first question I asked is what is the current status of university programs in measurement science. I am informed that there are none, though George Washington University had attempted such a program some years back. If measurement science is so important, why are not adequate programs already in existence? It seems to me that there are at least two significant reasons.

One possible reason why educational programs in management science do not presently exist in universities may be that the conventional organization of universities does not readily accommodate the essentially interdisciplinary character of the educational program that would need to be designed to train measurement scientists. I believe it was former Governor Campbell of New Mexico who observed that attempting to change an academic department is much like trying to move a cemetery--it has as many complications, and many of the same implications. It is, of course, true that universities typically are organized into departments by academic discipline. Attempts to bridge or recombine these organizational forms are indeed extremely difficult. At the same time, one important reason why UTD is seriously interested in the possibility of inaugurating a Master's level program in measurement science is that the design of the university is in large measure interdisciplinary in character. The newest five of our Ph.D. programs, for example, are not in traditional

disciplines. Rather they are in environmental sciences, communication disorders, international management, political economy, and a cohesive integration of literature, aesthetic studies, and history of ideas in the humanities.

In any event, the subject of the relation of organizational form to the nature of knowledge and the conduct of human activities is a complex and even profound subject that need not occupy further attention today, except to say that it is my assumption that graduate education in measurement science must, of necessity, be interdisciplinary.

A second reason for the absence of graduate programs in measurement science may be that educators have yet to appreciate the changing character of the measurement sciences themselves.

This was illustrated to me with the example of such change in the medical thermometer. For years the device was a column of mercury in a glass tube, requiring several minutes to expand to a readable condition. Today, we have a thermally sensitive probe with electronic readout that reads in seconds; and the data can be transmitted to remote locations. We also have available to us a strip of plastic which can be held against our skin and which changes color with temperature, according to a digitally indicated code. Apparently the science of measuring body temperature today involves faster, simpler operations; but the operations are based on more complex technology involving several traditional technical disciplines.

I understand that measurement technology has changed in the last generation from simple mechanical, electrical, or optical devices to sophisticated computerized systems. I am told that the development, since World War II, of electronic data processing hardware, and its associated software, have caused a technological revolution in measurement science. The use of computer speed and memory to gain data processing advantages on a real time basis has generated a hunger for computer inputs. Measurement devices are being sought to sense, quantify, and generate data proportional to physical characteristics on a real time basis. And the measurement system may involve any number of technical disciplines other than electronics.

In short, a body of measurement science knowledge is developing rapidly, and it may be that it is timely to collect and formalize such knowledge in sufficient quantity and appropriate forms of elaboration to justify a graduate degree program in measurement science. If this is the

case, a final critical question remains--what are the career opportunities in business and industry and in government for the graduates?

If we are to invent a new graduate program, there must be career opportunities for the graduates and a related ability to attract qualified students to these opportunities.

To this end, as a next step in our learning, we have scheduled a two-day seminar and workshop in Dallas for September 30 - October 1, 1980. Last month the National Bureau of Standards mailed out preliminary announcements requesting an expression of interest in attending the workshop to assist us in our planning. To date, approximately 200 people have indicated their desire to attend the seminar/workshop at Dallas. In reaction to this encouraging response, we are preparing a final program mailing for next month, with formal registration material attached.

The first day of the program will include presentations by speakers from various industrial and government organizations. The speakers will have backgrounds in a variety of technical disciplines. They will present their views regarding career opportunities and curriculum needs in measurement science. The second day will be devoted to workshops of interchange between the attendees and university scientists from chemistry, computer science, physics, statistics, and the environmental and management sciences.

A summary of the proceedings of the seminar and any recommendations that come forth will be circulated. It is intended that a two-month follow-up period will enable in-depth interviews with faculty and a sample of attendees, after the attendees have returned to work and have had opportunity to discuss the results of the seminar with their associates.

At that time--approximately December, 1980,--we hope to have the information on which to base a program development decision regarding education in measurement science.

In closing, I wish to emphasize that our interest at UTD is with education and research in measurement science. Our interest does not include training directed toward the measurement practitioner.

The application, use, regulation, and service of currently available technologies and hardware frequently require skills that are new to the practitioner. At UTD we are not equipped to provide this training.

Fortunately, NBS and Mr. Raskin last year had contacted the Texas A & M University system, among others. Our friends at College Station have expressed a positive interest in developing programs of training for the measurement practitioner. The Texas A & M system has, as one of its components, the Texas Engineering Extension Service, which is an established operation well-suited for training of a type that appears to be needed.

The extension service decision-makers also want to be sure of their ground before commitment of plans. Therefore, they have established a goal for conducting a seminar/workshop in January, 1981. Their workshop program will be similar to ours, except it will be dedicated to identifying needs for "training in measurement practice."

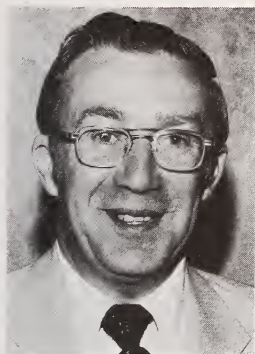
In spite of the well-known rivalry between the University of Texas and the Aggies at College Station, I am pleased to report that Dr. Lee Phillips of the Texas Engineering Extension Service visited our campus last month to compare notes as to the directions being taken by the two institutions. We will continue to coordinate our independent activities so that, together, the total need for education and training may be met.

While I have had the privilege of bringing you news of the thinking and plans to date, a large number of people have been, and currently are, involved in this work. People who are present today--and who are more familiar than I regarding certain specific areas of the program--including Dr. Ernest Ambler, Director of NBS; Mr. Albert Tholen, Chief of the NBS Office of Weights and Measures; Dr. Lee Phillips of Texas Engineering Extension Service; Mr. Charles Vincent, Director of Consumer Affairs for the city of Dallas and your National Conference Chairman, and Mr. S. H. Raskin of the Raskin Corporation, who has coordinated our activities.

I wish to express our appreciation to these people for leading us in the directions we have taken, and I am grateful for this opportunity to tell you what we are about.

THE SCALE MANUFACTURERS ASSOCIATION REPORT ON
SCALE TOLERANCES

Presented by JOHN J. ELENCO, JR., Vice President-Engineering
Revere Corporation of America



The Scale Manufacturers Association, a non-profit organization, was established by scale industry leaders in 1945 to provide a permanent instrumentality for coordinating the efforts of many individuals in the best interests of the public, the owners and users of scales, and the scale manufacturers. Since its inception, SMA has enjoyed an unusually high degree of respect and appreciation from the public, affiliated professionals, and Government regulatory agencies.

Since April of 1979, the SMA has been engaged in an effort to review the structure of tolerances for weighing devices. This effort is an outgrowth of proposals put forward at the Southern and Western Regional Weights and Measures Conferences and at the interim meetings of the National Conference on Weights and Measures in 1979. As a result, the SMA had gone on record with the NCWM to address this subject.

FACTORS LEADING TOWARD A REVIEW OF THE TOLERANCE STRUCTURE

Before getting into the details, it would be wise to review the factors that have led to the necessity of reviewing our national tolerance structure.

The first factor is the advancement of electronic technology. In recent years, particularly as a result of efforts in space, an entirely new technology has been developed--that of semiconductor devices, integrated circuits, and now microprocessors. This technology is having a profound effect on the design and performance of weighing devices.

A second factor is the increased dependency among members of society, particularly as a result of resource limits and distribution. No one community, State, or nation possesses all the resources that it needs to operate its economy. And so, goods and services based on weight become increasingly more important as sophistication in society increases. This is further kindled by a third factor--that of the increased efficiency of communications and transportation--in other words, our shrinking world.

With communication satellites, jumbo aircraft, and super sea carriers, we are able to communicate and move commodities at a rate heretofore unknown. As a result, the need to upgrade existing scale codes has resulted in a high rate of revision, sometimes with discontinuity and confusion. Superimposed upon that are the generation of independent new scale codes, both nationally and internationally, which has resulted in a genuine need to harmonize these codes for reasonable uniformity.

PURPOSE AND SCOPE

With this in mind, a group of experts in the field met for the purpose of establishing a base working draft document to serve as a launch point for expanded discussions. The purpose of the effort is the construction of an acceptable, simplified tolerance structure for commercial weighing devices, incorporating the views of concerned and interested parties. It was agreed that the simplified tolerance structure should apply, within the technical resources available, to all scale types now covered in the Scale Code of NBS Handbook 44. Belt conveyor scales are specifically excluded.

CONSIDERATIONS

In this effort, consideration would be given to the desirability for the new simplified tolerance structure to be in reasonable harmony with the principles of the International Organization of Legal Metrology (OIML), and be structured for ready adaption into a national metrological control system. The effort would also consider existing codes for scales and seek out the viewpoints of the NCWM, the Office of Weights and Measures, the Federal Grain Inspection Service, the Packers and Stockyards Administration, the American Railway Engineering Association, and other interested parties. Every attempt would be made to coordinate and resolve conflicting tolerances among various scale codes in the interests of national uniformity.

A second major consideration would be an attempt to quantify the environmental performance requirements for weighing devices, to the extent possible within the current state of the art. By becoming more specific, we can reduce the amount of judgment required to determine suitability of the weighing device for conformance with the intent of NBS Handbook 44.

PARTICIPATION

A first draft tolerance structure was produced after an approximate 6-month period by members of the Scale

Manufacturers Association. Immediately following the end of the interim meeting for the 1980 Conference last January, an expanded participation committee was formed to deal with the subject of scale tolerances. The first draft was presented as a starting point for discussion. The committee presently includes representatives of the American Railway Engineering Association, the Federal Grain Inspection Service, the Office of Weights and Measures of the National Bureau of Standards, the National Conference on Weights and Measures Specifications and Tolerance Committee, the National Grain and Feed Dealers Association, the National Scale Men's Association, the Scale Manufacturers Association, the Packers and Stockyards Administration, and others. Participation is not limited.

CONSENSUS

The committee utilizes the consensus process. Consensus is defined as substantial agreement reached by concerned or affected interests according to the judgment of a committee. All matters discussed are resolved on the basis of a consensus. This implies more than a simple majority. The committee must consider the viewpoints of one, two, or other minority interests and do its best to resolve conflicts. When a consensus is achieved, the matter will proceed. If some disagreement remains, it can be noted for the record if the dissenter so wishes.

TIMETABLE

With a base draft and a consensus procedure in place, a timetable was established to provide the committee with goals. During 1979, the base organization was brought together--the first draft document produced. During 1980, the expanded organization was formed. Today, we are refining the draft and nearing completion of a final recommendation. It is our intention to submit that final recommendation to the National Conference on Weights and Measures at its 1981 Interim Meeting. Hopefully, during 1981, the United States' position can be finalized on the matter of tolerances. This position can then serve as the base of future negotiations by our representatives to OIML.

TOLERANCE STRUCTURE

At this point, I would like to generally describe the tolerance structure under consideration. The tolerance structure is intended to be performance-oriented, rather than design-oriented. It is intended to serve as a base structure for defining the tolerances appropriate for

pattern approval, initial verification, and subsequent verification. Pattern approval is closely related to type approval. It is the extensive laboratory testing of a representative article of a weighing device. Initial verification is the first verification of each individual weighing device, as it is first put into use. And finally, subsequent verifications are the regular, periodic verifications that take place during the life of the weighing device.

PRINCIPLES

The tolerance structure is intended to be independent of the device measuring principles. The device may be electronic, mechanical, hydraulic; it may employ beams, strain gages, diaphragms; it may be analog, or digital. Regardless, all weighing devices are subject to the same performance requirements. The tolerance structure is based on a step-type error function. This simplifies field testing requirements. The inspector is no longer required to interpolate. The tolerance for an analog device is identical with the tolerance for a digital device. The tolerance is expressed in number of divisions.

ACCURACY CLASSES

The tolerance structure has provisions for accuracy classes. Two or more accuracy classes are anticipated, and they are characterized by different tolerances. The tolerance values are plus and minus. For example, at a given test load, the tolerance might be plus or minus three scale divisions. In the case of tare, the tolerances apply from the tare zero reference or, in effect, to the net loads. The tolerances apply for both increasing and decreasing loads and within a normal specified temperature range.

There are provisions within the tolerance structure for tolerances relating to multiple, indicating, recording, and ranging devices. The tolerance structure also provides for the evaluation of main components when submitted separately. However, it is not intended that a weighing device be disassembled in order to test separate main components. This provision is intended only to provide guidance for the evaluation of main components when they, as entities, are submitted separately.

OTHER FACTORS

The tolerance structure goes on to include a host of other factors, which include the following:

- o A tolerance is provided requiring agreement between multiple representations.
- o A minor allowance is anticipated for load indication variation with time, the creep phenomenon, and will also include zero recovery.
- o A tolerance is established for repeatability.
- o A tolerance is established for variations due to load displacement, commonly referred to as "shift test."
- o Tolerances are provided for sensitivity and discrimination, as appropriate, and in both the loaded and unloaded condition.
- o Consideration is given to the requirements for leveling the weighing device.
- o Limits are established for both temperature and humidity within which the weighing devices must perform within the tolerances. Provisions are also made for special temperature and humidity ranges for those cases where the normal range is unacceptable. In addition, tolerances are established for both temperature and barometric effects on the device zero indication.
- o The tolerance structure includes a provision that precludes unusable readings until the weighing device has reached operating temperature.
- o The tolerance structure establishes a range of electric power limits for both alternating current and battery power within which the device must

remain in tolerance. A further consideration includes the prevention of unusable indications following power disruption.

- o The tolerance structure includes a consideration for operation under conditions where the load is in motion.
- o And finally, where it has not been possible to quantify, a motherhood statement is provided indicating that the application and utilization of a weighing device must also take into consideration other influences, such as that of wind, snow, EMI, etc.

I am happy to report that the spirit and motivation of the individuals participating in this effort is high. There is a genuine willingness to consider each other's viewpoints. There is a genuine effort underway to harmonize to the greatest possible extent with the viewpoints of the international community as represented by the International Organization of Legal Metrology. The committee has worked hard and long, and there is much work yet to be done. Though the task is formidable, the opportunity is present today to conduct an in-depth review of our tolerance philosophy and structure. The time is right, and we are looking forward with "Great Expectation for the Eighties."

THE ROLE OF THE U.S. METRIC BOARD IN THE VOLUNTARY
CONVERSION OF GAS PUMPS TO METRIC MEASUREMENT

Presented by STEPHEN A. VASTAGH, Program Manager,
U.S. Metric Board



Good afternoon! It is an honor to participate at this important, well-organized Conference. I bring you regards from Syd Andrews of Florida, your representative to the United States Metric Board. Syd, who is Senior Vice President of the American Society for Testing and Materials, cannot be with you today because he is chairing an ASTM Petroleum Products and Lubricants Committee Meeting.

The United States Metric Board was created by the Metric Conversion Act of 1975 as an independent agency to coordinate the voluntary increased use of the metric system in the United States. The role of the Board, in general, is to actively implement the national policy of voluntary conversion. To carry out this role, the Board has responsibilities in the areas of research, planning, coordination, and public education. The key element of this national policy is its voluntary nature; rather than occur by force of law, metrication is to proceed by the voluntary, coordinated decisions of each segment and sector of our society.

One of the current activities of the Metric Board is the coordinating of the ongoing conversion of gasoline pumps to measure by the liter, a metric unit. This conversion reflects the voluntariness expressed in the national policy.

The role of the Board in this process is not to advocate or promote metric conversion of gasoline pumps, but to assist those who voluntarily decide to change to liter dispensing. This responsibility involves specific research, coordination, and public education. I will describe the Board's past and current activities in that order.

RESEARCH

The steady climb in early 1979 of gasoline prices toward \$1.00 per gallon posed a problem for petroleum retailers since most pumps could not compute prices above

this level. This was brought to the attention of the Board by various governmental and private groups. The USMB became involved as we recognized that some action by the private sector was imminent and because the potential existed to gain a national savings by converting gas pumps to dispense by the liter. An important element of this potential savings was savings by the small businessmen that own or operate the majority of the nation's service stations. In May 1979 the Board gathered information through public hearings and conducted additional staff research that analyzed costs and other factors associated with the various alternative solutions.

Based on testimony given at the hearing and the subsequent economic analysis and research, the USMB staff issued a detailed report which concluded that equipment costs could indeed be saved by converting pump computers to liters. The report also stressed the importance of providing adequate information at the pump to allow unit price comparison and to ensure consumer understanding.

PLANNING

As a result of the hearing and subsequent research, the Board declared in June 1979 that it was an "opportune time for the development of a planned and coordinated voluntary program of dispensing gasoline by the liter" and urged "all affected parties to participate in the planning process."

The planning was undertaken by the American National Metric Council's Petroleum and Natural Gas Sector Committee task force composed of representatives of jobbers, retailers, equipment manufacturers, weights-and-measures officials, consumers, and trade associations.

COORDINATION

In the dynamics of the marketplace, events frequently overtake planning. It has been true in this situation. Actual conversion began in the marketplace with the first station changing on March 27, 1979 in Oregon; the second on May 4 in California; and the third again in Oregon on June 1. The conversion rate increased during the summer and in October there were about 600 stations measuring by the liter. In July 1979 your organization, the National Conference on Weights and Measures, adopted a policy statement that provided guidelines for liter dispensing along with recommended timeframes. The U.S. Metric Board responded to the National Conference's Policy Statement and to the actual conversion in the marketplace by approving a 13-point program of coordination and public education.

The basic and most necessary element of coordination is to assure that all the various parties involved are aware of each other's activities. To do this the coordinators must know who the parties are and what their apparent or committed positions are at any point in time. This necessitates a constant monitoring activity.

The greater the number of involved parties, monitoring and coordination becomes more difficult. As you can see from figure 1, in the voluntary conversion of gas pumps the number of parties involved is quite large. Although accurate data are not available, these estimates will indicate the approximate size of the groups. Each of these thousands of individuals makes decisions voluntarily and independently. The relative impact of each of these decisions depends on both the number of pumps owned by the decisionmaker and the degree of control this decisionmaker has over making an equipment change of this kind.

<u>Decisionmakers</u>	<u>Ownership of Pumps</u>
21 major and semi-major oil companies (80 000 lessee dealer outlets)	40 percent

200 independent refiners and/or marketers	
15 000 jobbers	60 percent
50 000 branded contract dealer outlets	
investors	

100 trade associations (national, regional, State, local).	
100 government agencies (Federal, State - Weights and Measure, Revenue, Consumer Protection, etc.	

Figure 1.

Although approximately 40 percent of the equipment is owned by the largest companies, most of it is leased or operated by independent businessmen. The independent dealer is a decisionmaker with respect to a change to liter dispensing just as he is in pricing the product. Additionally, the potential change of the remaining 60

percent of the equipment depends on an even larger number of independent decisionmakers, as you can see from figure 1. Trade associations and various governmental bodies also have an effect on the process.

It is clear that monitoring and coordinating among so many independently acting parties is an overwhelming task. The best we can do is to gather as much information as possible and make it available to the parties involved so that they may make informed decisions.

In this regard we attempted to monitor the extent of completed conversions and associated matters. We found that 46 States were converting. These 46 States now allow liter dispensing. There is no liter dispensing in Alaska, Connecticut, Massachusetts, and West Virginia. These four States, plus the District of Columbia, are in the process of making a decision.

The number of stations estimated to have converted to liter dispensing was approximately 9000 and according to new estimates I just received from some States, it may be up to 10 000-10 500. While this is a large number, it is only a little over 5 percent of the total estimated number of service stations. Nor is it necessarily the latest status as the data on some States are several months old. It is virtually impossible to have up-to-date information because of the fragmented nature of the process and because the situation is constantly changing. In June 1979 there were virtually no liter stations. In October there were 600. By December that had doubled to 1200. In February of this year it had reached 4000. The deadlines for discontinuation of half-pricing have been set by 36 States and the District of Columbia.

In addition to our own direct efforts to keep track of conversion, you, the State Weights and Measures officials, have provided invaluable information and assistance. Trade organizations have also conducted their own market surveys. The American Petroleum Institute, the Society of Independent Gasoline Marketers, the National Oil Jobbers Council, and the Service Station Dealers of America were asked to determine what kind of equipment modifications are being made.

The combined membership of the organizations conducting the surveys accounts for the great majority of service stations. API's survey, to which 19 companies responded, indicates the status as of April 1, 1980. The results illustrated in figure 2 show that of the 561 000 computers surveyed, 220 000 have been modified. Of the 220 000 modifications, 144 000 or 65 percent have over-a-dollar capability and 160 000 or 73 percent have metric capability.

SERVICE STATION PUMP COMPUTER SURVEY

Status as of April 1, 1980

1.	Total number of units requiring change or modification due to limited pricing capability	<u>561 000</u>
2.	Total number of units provided with whole unit pricing exceeding \$1/gallon	<u>144 000</u>
3.	Total number of units provided with capability to indicate price/liter	<u>160 000</u>
4.	Total number of units using metric capability	<u>24 000</u>
5.	Total number of units modified or changed	<u>220 000</u>
6.	Total number of units remaining to be changed or modified	<u>341 000</u>

Note: Items 2 and 3 do not equal Item 5 due to the dual capability of some units.

Of those units modified 65 percent have over-a-dollar capability and 73 percent have metric capability.

Approximately 4.3 percent of the units surveyed are being utilized in the metric mode.

Approximately 39 percent of the conversion has been completed.

The above figures represent the results of a poll in which 19 companies responded. It includes all of the larger oil companies. The figures confirm the estimate that the "majors" own approximately 40 percent of the dispensers in use. This includes equipment at owned or leased locations plus equipment furnished through contract arrangements.

Figure 2.

The API returns indicate that more computers priced in the \$1-plus mode (144 000) than in liters (24 000) on April 1 and that the majority of the 144 000 have liter capability as well. We appreciate the efforts of the trade associations as their surveys contribute to the overall coordination.

Additional information from Veeder-Root Company indicates that during the 12 months following the May 1979 Board hearings 442 000 Model-2002 computers were produced. Approximately two-thirds or 300 000 were equipped with a gear box for metric conversion. In addition, over 150 000 metric gear boxes were supplied loose for field installation on existing equipment. Veeder-Root expects that the majority of 2002E computers--which are capable of handling prices up to \$2.99 per gallon--will be ordered with the metric gear box option. Coupled with other makes of gear boxes, direct gear conversions, electronic equipment, the majority of which have dual capability, this indicates the availability of a substantial aggregate liter dispensing capability.

Another aspect of coordination is to maintain contact with those organizations that need to take some action to accommodate the ongoing voluntary process, in other words to see that everybody is in step with each other. The coordinating function is to provide to these organizations (e.g., State and Federal agencies, North American Gasoline Tax Conference) current information and suggest to them the possibility that some action is needed. As we make suggestions, we hope that we are not misunderstood and perceived to be presumptuous; we do not profess to have all the answers, nor do we want to introduce an improper bias in the voluntary decision making process. We merely call the attention of the parties to the issue. This is a function of coordination. For example, one of the issues we are currently discussing with DOE is the effect of rounding, in the conversion from gallon to liter price, on the maximum legal selling price.

Yet another aspect of coordination is to bring real or perceived problems that are discovered during the monitoring activity to the attention of the various parties who have jurisdiction in the area. Again the coordinator--who is by definition a jack-of-all-trades but expert in none--provides no answers, merely calls attention to the issue. We did this during a recent news briefing by pointing out various ongoing price posting practices. Figure 3 shows four stations all selling at the same price. We urge this Conference and other organizations to take action; we will then coordinate solutions agreed upon by the affected parties, because the Board does believe that the consumers should be given the opportunity to easily compare prices.

THE PROBLEM

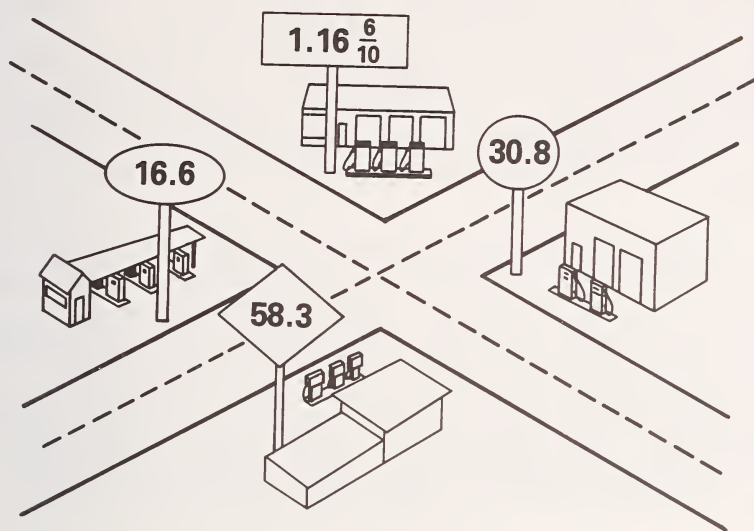


Figure 3. The problem.

As I mentioned earlier, the role of the Board is not to promote but to provide facts for informed decisionmaking. Toward this end we have prepared a guide to the selection of retail motor fuel dispensing equipment. This guide provides to the service station owners information on the types of equipment available to help decide whether to modify, rebuild, or buy new equipment. We are soliciting comments on this document from relevant organizations including this Conference and will make the guide available to trade associations for distribution to their members.

PUBLIC AWARENESS AND EDUCATION

The last major area in which the Board has a role is Public Awareness and Education. We have already produced a series of four radio public service announcements which are being distributed directly by the USMB to radio stations in areas where conversion activity is occurring. Petroleum marketers, weights and measures officials, and others are invited to request such distribution by us to

radio stations in areas where conversion is underway. These media spots are not designed to endorse or encourage conversion, rather to explain why it is happening, to familiarize motorists with the meaning of a liter, and let them know where to get more information.

Listener response to these spots helps us to gauge public reaction and to determine the need for specific types of education materials. We have found, for example, that one of the biggest concerns people have is how to figure their gas mileage. We will be making that information available and encouraging others to do likewise. Preliminary review of these listener responses indicates that around 98 percent of the approximately 230 letters ask for more information and 2 percent are opposing liters.

We are also developing television public service announcements for distribution to broadcasters in affected markets. As the last major current Public Awareness activity, we will soon have ready a packet of camera-ready consumer education materials designed particularly to assist the independent marketers who are interested in converting but do not have the resources of a major supplier behind them. The packet will include camera-ready copy for a customer handout booklet, pump toppers and window signs, conversion charts, and other materials.

A State, regional, or national retailer, or a jobber association could reproduce this material using the camera-ready copy provided by the U.S. Metric Board and offer it for sale to its membership. This would enable the retailers to provide information to their customers at a much lower cost than if they designed and printed it individually. The camera-ready material will provide space for individual station identification. With this material the Board aims to increase the consistency and accuracy of information provided to the consumers.

The fundamental objective of the National Conference on Weights and Measures is to encourage and promote uniformity of requirements and practices among jurisdictions. The importance of this objective is demonstrated in this issue of retail motor fuel dispensing.

The Board recognizes the significant contribution to national coordination that this Conference has already made with your 1979 Policy Statement. I look forward to continued good cooperation between the U.S. Metric Board and the National Conference on Weights and Measures. We have similar aims in that the Board is committed to informing and protecting the consumer, the buyer, and, although not well enough recognized and publicized, the

weights and measures officials are true professionals dedicated to protecting buyers and sellers, thereby ensuring that equity may prevail.

REPORT BY THE
SPECIAL STUDY GROUP ON ENFORCEMENT UNIFORMITY

Introduction by KENDRICK J. SIMILA
Administrator, Weights and Measures Division,
State of Oregon



It is my pleasure this morning to report to you as co-chairman, together with Chip Kloos of Hunt-Wesson Foods, on the activities to date of the NCWM Special Study Group on Enforcement Uniformity.

One of the fundamental objectives of the National Conference on Weights and Measures is to encourage and promote uniformity of requirements and practices among jurisdictions. The NCWM has achieved considerable success in developing and seeing through to their adoption, various model State laws and regulations used in the enforcement of measurement standards requirements by the States, counties, cities, and territories. It is apparent, however, that the enforcement practices and procedures actually employed by the different jurisdictions has significantly affected the actual level of uniformity achieved in the field.

Concern about the long term implications of non-uniformity in weights and measures enforcement at the State and local level led to the appointment during the past year of this special Study Group by the Conference Chairman, Charles Vincent. The study group, consisting of four weights and measures officials and four members from industry, first met during the NCWM interim meetings of the Conference standing committees last January.

The identified goal or purpose of the Study Group is to achieve a high degree of uniformity in weights and measures enforcement policies and practices. In recognition of the extremely wide range of measurement standards responsibilities that weights and measures jurisdictions have throughout the U.S., the initial scope of the Study Group's efforts was deliberately limited to issues involving enforcement practices pertaining to packaged products. It was felt that the Group's involvement in other areas where weights and measures uniformity of enforcement is an issue may be appropriate or desirable, but only after the issue of uniform package control has been adequately addressed.

The Study Group determined three fundamental objectives that, when satisfied, would contribute toward meeting its goal. These objectives are:

1. To identify the net content enforcement practices of the States and principal local jurisdictions.
2. To identify the degree of consistency or uniformity in the enforcement practices among these jurisdictions.
3. To recommend to the National Conference on Weights and Measures through the Committee on National Measurement Policy and Coordination, ways and means of increasing the degree of uniformity among the various jurisdictions.

The approach taken toward fulfilling objectives one and two was to develop and send to all the State-level and to 16 of the principal local weights and measures jurisdictions a questionnaire about their package enforcement programs. Analysis of the information received from these jurisdictions will serve as a basis for developing recommendations to fulfill the third objective.

Prior to the 65th National Conference in June, 1980, 94 percent (50 of 53) of the State-level weights and measures jurisdictions and 60 percent (9 of 15) of the local jurisdictions responded to the Study Group's four-page Enforcement Policy and Practice Questionnaire. This was a very encouraging overall response of 87 percent (59 of 68).

Here to report on the tabulation of the questionnaire responses to date, and to describe the preliminary results is Chip Kloos, Study Group Co-Chairman, from Hunt-Wesson Foods.

PRELIMINARY REPORT ON RESPONSES TO ENFORCEMENT
UNIFORMITY QUESTIONNAIRE

Presented by CHIP KLOOS, Section Head,
Research and Development
Hunt-Wesson Foods, Inc.



Thank you Ken and members of
the Conference.

The questionnaire developed by
the Study Group was designed to
collect information about the net-
content, package-inspection programs
utilized by weights and measures
officials. The questions were
divided into four areas which included:
1) Identification of the net-content
compliance standards utilized by
each jurisdiction. 2) How these
standards are interpreted and applied
3) Action taken when evidence of low-net content is
found. 4) Frequency of enforcement options utilized.

The preliminary results consist of a summary of the
responses to each question and are shown in tables bearing
the question number. In general, the results indicate
that although there is a reasonably high degree of uniformity
with regard to established package-compliance standards,
there is a significant amount of variation in how these
standards are interpreted and implemented. By standards,
we mean official net-content compliance requirements and
not physical-test standards.

The first question asked "What are the package
net-content standards of your State or jurisdiction?".
The responses are shown in table 1A. Fifty-six of the 59
respondents answered this question. Upon close exami-
nation of the "other standards" submitted as copies to
the Study Group, we found that several included the
provisions contained in the National Bureau of Standards

Table 1A. Net-content standards.

<u>Standards Used</u>	<u>Number Responding</u>
1. NBS Handbook 67 only	30
2. Other standards	16
3. Combination of both HB 67 and other standards	10
Total	<u>56</u>

Handbook 67. In fact, overall, 49 of the 56 or 88 percent of those responding utilized the provision of Handbook 67.

Table 1B summarizes the responses to the question "How were these standards adopted?". Fourteen respondents indicated that more than one method was used to adopt the standards. Over 70 percent indicated that the standards received official legal recognition by nature of the fact that legislative acts or administrative rule were utilized to adopt them.

Table 1B. How were standards adopted?

<u>Method of Adoption</u>	<u>Number</u>
Legislative act	35
Administrative rule	15
Local ordinance	5
Policy decision	13

Table 1C summarizes the responses to the question "Are the State package net-content standards uniformly enforced throughout your jurisdiction?". As one would expect, there was a high degree of implied uniformity. However, the responses of the States usually excluded reference to large metropolitan jurisdictions within the State where separate weights and measures offices exist or where Federal jurisdictions such as the USDA or FDA were involved. Most States strive for uniformity but recognize that deviations exist.

Table 1C. Are standards enforced uniformly throughout jurisdiction?

<u>Response</u>	<u>Number Responding</u>
Yes	54
No	4
Total	<u>58</u>

Table 1D shows the responses to the question "If local net-content standards are enforced, do they conform to the State standards?". For those States where no local standards exist or where specific knowledge of the local standards is lacking, the response "not applicable" was used. We also recognize that some local jurisdictions may conform to the State standards but may also go beyond them by enforcing more rigorous standards.

Table 1D. Do local standards conform to state standards?

<u>Response</u>	<u>Number Responding</u>
Yes	33
No	0
Not applicable	26
	<hr/>
Total	59

Table 2A-C summarizes the responses to the questions concerning the amount (percent) of the total weights and measures activity devoted to net-content enforcement of standard packages. The question asked first identified the percent of the total weights and measures activity devoted to package-control programs. Then, what percent of the package-control activity was devoted to standard-package programs? Finally, what percent of the standard-package programs was devoted to net-content enforcement? By multiplying these three percentages together, we inferred for each respondent what percent of their total activity was devoted to the net-content enforcement of standard packages. The results indicate that the average portion of all weights and measures activities spent on this effort is approximately six percent. We recognize that this may be a rough estimate and that the range of individual responses varied from less than one percent to over 40 percent.

The next four questions were designed to identify how the standards are interpreted and applied. Table 2D summarizes the responses to the question "If a group of 34 packages on a shelf has two different date codes, one with nine containers, the other with 25 containers, how would you choose the items for an inspection sample?". This question was intended to see whether an inspection lot at retail is composed of a single-date code or a composite of date codes. Eighty-six percent of the respondents indicated they would draw two separate samples, one from each date code.

Table 3A shows the responses to the question "What is your lot acceptance/rejection criterion based on?". The results indicate that 80 percent of the respondents utilize both the sample average and individual errors as the basis, while 10 percent utilize only one criterion.

Table 2A-C. Percent of activity devoted to package control programs.

Activity	Average Percent	Number responding by percentage class					Number Responses
		0%-9%	10%-19%	20%-29%	30%-39%	40%-49%	50% +
A. Percent of total activity devoted to package control programs	32	4	8	19	7	9	11
							58
B. Percent of package control activity devoted to std. package programs	30	11	17	8	2	3	17
							58
C. Percent of std. package programs devoted to net-content enforcement	46	12	7	7	3	1	27
							57
Percent of total activity devoted to net-content enforcement of std. packages	Average Percent	Number responding by percentage class					No. Resp.
		Less than 1%	1%-3%	4%-7%	8%-10%	More than 10%	
	6	22	12	6	5	12	57

Table 2D. How would an inspection sample be chosen?

<u>Response</u>	<u>Number Responding</u>
Draw one inspection sample combining both date codes	8
Draw two inspection samples, one from each date code	50
	<hr/> 58

Table 3A. Lot acceptance/rejection criteria.

<u>Response</u>	<u>Number Responding</u>
Sample average only	4
Individual unreasonable errors only	1
Both sample average and unreasonable individual errors	40
Other bases	5
Total	<hr/> 50

The information in table 3B summarizes the responses to the question "If an inspection sample of packages with a declared net weight of 12 oz has an average net weight of 12.05 oz but two of the containers have a net weight of 11.65 oz, what would you conclude about the lot?". The objective of this question was to see how a sample with an acceptable average net weight and two unreasonable individual minus errors (underfills) would be considered. It is interesting to note that in table 3A, 82 percent indicated that unreasonable individual errors were used as a basis for lot acceptance (rejection). However, in this table (table 3B), 34 percent indicated they would pass the lot and only 34 percent indicated they would fail the lot even though there was an excessive number of unreasonable individual errors in the inspection sample.

Table 3C summarizes the responses to the question "If an inspection sample of 12-oz containers has an average net weight of 11.98 oz, what would you conclude about the lot sampled?". The objective of this question was to see how a sample with a low average net weight would be considered. Table 3A indicated that 88 percent used the sample average as a basis for lot acceptance/

rejection but only 59 percent of the responses to this question noted that they would fail the lot.

Table 3B. Action taken if an excessive number of unreasonable underfills are found in an inspection sample.

<u>Response</u>	<u>Number Responding</u>
Pass lot	20
Take more samples	8
Mark underfills off-sale	1
Fail lot	20
None of the above	10
Total	59

Table 3C. Action taken if a low average net weight is found in an inspection sample.

<u>Response</u>	<u>Number Responding</u>
Pass lot	9
Take more samples	3
Mark underfills in sample off-sale	2
Fail lot	35
None of the above	10
Total	59

Tables 3B and 3C highlight the fact that the lack of uniformity is greatest in the interpretation and application of the standards and not in the standards themselves.

The responses to question 4A, which sought to identify under what conditions various enforcement options would be exercised, are not included here for the sake of brevity.

Table 4B highlights the frequency with which the various enforcement options are utilized. For the purpose of clarification an assurance of voluntary compliance plea is a consent order, one that states that from now on, we will comply; civil penalties involve no criminal implications; prosecution implies criminal intent, and an

injunction is a court order. We see that marking containers off-sale and warnings are used most frequently and that injunctions and civil penalties are used the least.

Table 4B. Frequency of enforcement options utilized.

<u>Option</u>	<u>Number Responding</u>		
	<u>Never</u>	<u>Sometimes</u>	<u>Always</u>
1. Marking containers off sale	0	21	36
2. Warnings	0	26	31
3. Assurance of voluntary compliance plea	11	24	17
4. Administrative hearings	19	31	4
5. Civil penalties	27	23	1
6. Injunction	23	27	0
7. Prosecution	5	49	1
8. Other	5	8	0

Table 4C summarizes the responses to the question "If an inspection sample fails your enforcement requirements, would you take a second sample to confirm your findings before taking legal action?". Eighty-six percent of those responding indicated that a second confirmation sample would be taken. This implies that many officials use a screening approach where the initial sample is used to identify potential lots in violation and the second sample is used to confirm the findings.

Table 4C. If sample fails compliance standard, would a second confirmation sample be taken before taking legal action?

<u>Response</u>	<u>Number Responding</u>
Yes	51
No	8
Total	59

The preliminary results of our survey summarized in the ten preceding tables indicate that uniform standards would be helpful in insuring uniform-compliance practices but will not guarantee such practices. Attention must be focused on training of officials and their understanding of these standards. Further recognition must be given to the political pressures of the job, attitude of the officials, and other factors affecting motivation, before any real uniformity in practice can be achieved.

Efforts will be made after this Conference to obtain responses to the questionnaire from the nine jurisdictions that did not send in replies as of June, 1980. In the coming weeks, the Study Group will further analyze the data from the questionnaires to identify specifically what enforcement policies and practices contribute most to problems of uniformity and consistency in package net-contents control. From this analysis, the group intends to develop its recommendations to the P&C Committee for ways and means of increasing the degree of uniformity among the various jurisdictions.

The Special Study Group intends to draft its final report at the Western Weights and Measures Conference in Juneau, Alaska, during the week of September 8 and to present the final report to the P&C Committee in ample time for consideration at the next interim committee meeting in Washington in January, 1981.

The Study Group on Enforcement Uniformity has also been approached concerning the possibility of expanding its study activity to cover other areas of weights and measures enforcement. Specifically, the Study Group will be exploring the feasibility of becoming involved in further consideration of the issue of a national metrological control program for the United States and in participating in or assisting with the NBS-sponsored study of the Bureau's programs of assistance to State and local weights and measures authorities.

MECHANISMS FOR THE UNIFICATION OF STATE AND LOCAL
LAWS AND REGULATIONS

Presented by WILLIAM J. PIERCE, Executive Director,
National Conference of Commissioners on Uniform State Laws



A person seeking unification of law in the discrete but complex area of weights and measures is faced with a bewildering task if the problem is approached from the perspective of pure legal power. The fundamental problem arises because of the fact that the power to adopt laws and regulations under the police power is shared by the Federal, State, and local levels of governments in the United States. Although Federal authorities seem to act as if unification can be achieved by actions of the States, the District of Columbia, and the Commonwealth of Puerto Rico, the fact is that thousands of local governmental units exercise various police powers for historical and economic reasons. Furthermore, in some instances, the police power is shared under the State constitutions with local units of government having home rule powers. In theory, therefore, extreme Balkanization of laws and regulations could evolve placing undue constraints upon the national distribution system for goods and services. In recent years there has been a growing tendency to respond to problems created by diversity among State and local laws by seeking Federal enactments which supersede State and local laws under the supremacy clause of the United States Constitution. However, with respect to several legal problems, Federal intervention remains impossible or impractical for a multitude of historical, political, social, and economic reasons. Therefore, other avenues for the achievement of uniformity must be and are being utilized effectively.

Despite the potential horror story of a mass of conflicting State and local laws impeding the channels of commerce, in reality a substantial amount of uniformity is obtained through formal and informal channels in the United States. Two questions may well be posed: First, what mechanisms are available for the unification of State and local laws, and second, why are these mechanisms successful in obtaining a reasonable level of unification?

Among the States two formal devices might be employed: namely, compacts or agreements and uniform State laws.

Laws
In a number of areas, the States have entered into formal contracts to handle various regional or national problems that transcend State lines. If sovereignty is involved in the compact arrangement, approval of the compact by Congress is essential under the United States Constitution. If sovereignty is not involved, the agreement among the States does not require Congressional approval, and the States have entered into a number of agreements dealing with enforcement of laws, exchanges of information, and joint auditing of tax returns. In some instances, State administrators are directed by their State law to cooperate with corresponding officials of other States in establishing uniform regulations.

Throughout our history uniformity in State law has been achieved by the common device of borrowing and copying statutes in sister States. In 1892 a more formal mechanism for the development of uniform laws was commenced by the creation of the National Conference of Commissioners on Uniform State Laws. At that time, each State was requested to establish a commission on uniformity of law within its own State, and each State commission was directed to participate with the corresponding commissions of other States in the development of uniform laws. Typically, the Commissioners on Uniform State Laws are appointed by the Governors of the States for fixed terms. In a few instances, certain State officials serve as ex-officio members of their State commission. Although the typical State commission has three members, some States have as many as nine members. However, within the National Conference, regardless of the number of commissioners, each State has one vote for purposes of voting on the promulgation of a uniform act. Today there are approximately 260 commissioners representing all States, the District of Columbia, and the Commonwealth of Puerto Rico. The National Conference of Commissioners on Uniform State Laws has directed its attention to the problems of unification of private law, with undoubtedly its most outstanding success being the Uniform Commercial Code which has been adopted in all States and the District of Columbia. You can readily understand the necessity for uniformity in the commercial law arena with the number of interstate transactions involved every single day. For example, each of us would encounter extreme difficulty if signing a check created different liabilities as one crossed State lines within the United States.

The National Conference works similarly to a legislative body in that special committees are assigned to topics and are to report their recommendations to the National Conference. Currently, approximately twenty special committees of the conference are preparing drafts of

proposed uniform legislation dealing with a multitude of subjects varying from condominium legislation to extradition and rendition. Each year the National Conference receives a number of suggestions from groups throughout the country for uniform laws. Each of these proposals is carefully reviewed by the Committee on Scope and Program, which selects a few new topics each year for inclusion in the program of the Commissioners. Obviously, subjects are selected on the basis of priorities viewed from the standpoint of the necessity and desirability of uniformity.

Once a special committee is established, a reporter, typically a law professor, is assigned to the committee to assist it in the research and drafting process. A typical committee will meet three or four times each year to develop the language of a uniform act and then present its draft at the annual meeting of the Commissioners. Uniform acts require two readings in the National Conference and therefore the processes are slow and deliberative. Some uniform acts, such as Uniform Commercial Code, take as long as twelve years for their development. Drafts of the proposals are circulated among all interested and affected groups for comment and criticism. In many instances a special committee is assisted by an advisory committee appointed by the President of the Conference. The advisors represent various affected groups, and various points of view are equally represented among the advisors. The committees typically meet for three consecutive days and work upon the drafts, line by line, in order to perfect the policy conclusions reached by the Committee in their deliberations. The Special Committee presents its proposal at the annual meeting by reading it line by line and any commissioner can propose Amendments or ask questions about any specific proposal of the Special Committee. As a result of this deliberative process, the Commissioners have developed considerable expertise, and the products are uniformly of high quality.

Uniform laws that deal with subjects that are constantly changing due to new and improved technologies create special problems. To be satisfactory for even as long as a decade, the legal structure must be so developed as to avoid inhibitions to new developments. That usually means that within certain broad legislative principles, refinements are to be made by regulations prepared by administrative officials. In many of these instances the Uniform Act will specifically require the administrative official to consult with corresponding officers of other States in drafting and approving rules that will maintain uniformity.

Of special interest to this group is the Uniform Metric System Procedure Act approved by the Commissioners last August. That Act specifically States that the "Act must be administered with a view to the conversion to the metric system in this State on a basis coordinated with developments in other States". Despite constitutional power in Congress to "fix the Standard of Weights and Measures," actual administration of weights and measures has been a State and local function. Necessary uniformity has been achieved by the efforts of this Conference. The uniform act recognizes these processes for avoiding conflicting requirements for commerce and industry by reorganizing "general accepted practices".

The informal processes for obtaining uniformity among States and local units of government within States have been more significant in our history than the formal processes. Informal processes have been effective for a number of reasons. Among them is the fact that problems occurring in one State or locality tend to emerge simultaneously in another State or locality. Secondly, knowledge of problems, and recommendations for their solutions, are obtained from a common fund of resources and from publications disseminated on a national basis. Third, Americans have developed a multitude of organizations that have a community of interests. Some examples are associations of State and local officials, associations of businesses, associations of labor, associations of consumers, etc., which provide a framework for discussing and analyzing problems and submitting recommendations. Each of these multitudinous organizations is turned to by persons seeking advice in resolving problems. Obviously, if the particular organization is the only one to have seriously considered the problem, the tendency will be for the product of the organization to be utilized by both the public and private sectors. If one examines regulations of State or local governments, he will often find exact duplication of terminology prepared by one of these unofficial organizations. In many instances, particularly at the local level, one will find the organization's product adopted by reference. Our common heritage, culture, education, and legal background make this informal process effective. Legally speaking, foreigners who examine our system of diffusion of law among the Federal Government, 50 State governments, and over 80 000 local governments look upon our system of law as an impossible morass. Practically and realistically, however, the system works.

On some occasions, particular strong and dedicated public officials and private citizens have led major movements for unification although lacking final authority to

compel that result. Immediately, Herbert Hoover, as Secretary of Commerce, comes to mind as a public official who made possible national distribution of various goods by stimulating efforts for standardization.

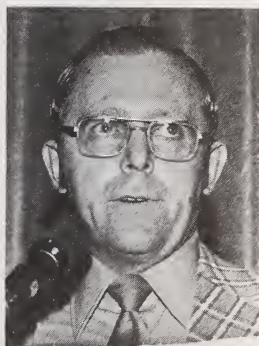
Our informal mechanisms for obtaining a practicable level of uniformity have two major advantages over the formal mechanism. The informal mechanism is more adaptable to changing circumstances and needs. The basis of uniformity is ever-changing, thereby requiring an evolutionary process. Formal arrangements often tend to rigidity because they represent factual circumstances and policies extant at the time of their promulgation. They tend to continue beyond the date of their effectiveness because of lethargy and the pressures of other business. Avoidance of strict legal uniformity allows continued experimentation among State and local governments. New and improved levels of uniformity are then evolved. Although pressures and demands for strict uniformity are often made, I would emphasize that caution is merited. Justice Holmes observed that the law is restated for each generation; therefore, we must be alert to the necessity of continuous change. Strict uniformity may impede desired and needed change unjustly and perhaps disastrously. In promulgating uniform laws, the Commissioners have recognized the need for constant monitoring. When new technologies or legal problems emerge, we either prepare recommended amendments or completely revise our previous recommendation. The availability of experimentation is the major strength of our Federal system. Certainly, at various stages experimentation has caused some undesirable results, but overall I have concluded that the experimentation has been extremely helpful and has improved our legal system.

The second major advantage of the informal mechanisms has been the opportunities afforded by them for broad citizen and expert participation in promulgating model laws and regulations. The existence of the informally devised models exerts a salutary influence on government decisions, making our elected and appointed officials accountable. Even in formal rule-making we have attempted to incorporate these benefits by requiring public notice of rule-making and affording public hearings on proposed rules under the Federal and State administrative procedure acts. The models provide a carefully considered set of rules, which can be compared with the formally adopted rules, and often a comparison of the model and official rules reveals the opportunities available for improved governmental services. Adoption of a responsible model as the official rule, of course, tends to strengthen the confidence in, and support for, government by the citizens and experts who participated in promulgating the model.

ASSOCIATION'S SPOT REPORTS

WESTERN WEIGHTS AND MEASURES ASSOCIATION

Presented by FRED A. GERK, Association President
and Assistant Chief, Weights and Measures,
State of New Mexico



The Western Weights and Measures Association held its last technical conference in Phoenix, Arizona, August 5-10, 1979. There were about 125 weights and measures officials and industry representatives in attendance. All of the standing committees of the Association developed their usual excellent final reports that were adopted by the Western Weights and Measures Association. The Association also developed three major policy positions that were pursued throughout this last year.

The first was relative to the Federal Grain Inspection Service approach to grain scale requirements and official testing. The Western Conference requested the Federal Grain Inspection Service to make use of present State and local resources and expertise to minimize costs and improve uniformity.

Another policy position encouraged FDA to require net weight labeling on aerosol containers. The third important position recommended major revisions within the Association: To develop voting procedures and a committee structure that basically coincides with that of the National Conference on Weights and Measures.

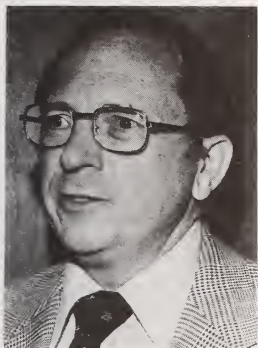
Other highlights of the Phoenix conference were the bestowing of Honorary Membership on Earl Prideaux of the State of Colorado, selection of Lyman Holloway of the State of Idaho to receive the coveted Ray Rebuffo Award, and the presentation of the prestigious Les Murphy Award to Bill Kerlin of California.

The Western Weights and Measures Association, at our meeting during the National Conference on Weights and Measures, will start the implementation of a new voting procedure and committee structure. We hope final adoption will take place in Juneau, Alaska, at our annual meeting on September 6-11, 1980.

This will be the first Western Weights and Measures Association Conference ever held in the State of Alaska. At this time, I would like to extend a cordial invitation to each of you personally to attend this meeting, not only for the aesthetic value of the trip, but for the outstanding program that we have developed. We are planning to depart from Seattle by ferry on Friday evening, September 5, and arrive in Juneau early Monday morning, September 8. The current plan is to hold our Association business meetings aboard the ferry, leaving the "on land" portion of the meeting to informative, panel-type discussions by a wide array of experts in various fields. The meeting will conclude with a banquet on Thursday evening, leaving the weekend open for enjoying the beauty of Alaska. We feel we are taking a rather unique approach to this meeting and are very optimistic about an extremely successful conference.

SOUTHERN WEIGHTS AND MEASURES ASSOCIATION

Presented by JAMES F. LYLES, Association Director and Supervisor, Weights and Measures, State of Virginia



On behalf of the SWMA it is my pleasure to invite you to the 35th Southern Conference on Weights and Measures to be held October 19-23, 1980, at the Heart of Town, Holiday Inn, Charleston, West Virginia. Dave Griffith, Director, Consumer Protection Division, West Virginia Department of Labor, our President, is making plans for a great conference in October. David is recuperating from a recent stay in the hospital and hopes to return to work by July 1. Dave deeply regrets that he could not be here today and he sends his best wishes to each of you.

The Southern Association has always had a good conference, backed by strong active members. Officials come from eighteen states, the District of Columbia, and a number of city and county jurisdictions. Each of our member jurisdictions has its own problems and we have found that by working together problems can be solved. Many of the problems noted at regional levels also exist at national levels. For this reason, over the years the Southern Association has had good working committees that have made outstanding contributions to the parent committee at National levels. The Southern Association is proud of its track record and is dedicated to striving for continued support and uniformity in application of model laws and regulations.

The Southern Association has enjoyed a good working relationship with industry representatives. Industry has been a vital part in the Association through support to the various committees, providing speakers for the programs, and giving assistance in State and regional technical training schools. We wish to take this opportunity to thank industry for their support over the years.

Several of our dedicated members have earned the opportunity and have gone fishing. They are George Johnson, Kentucky; H. K. Sharp, Oklahoma; and Jake Slaughter, Alabama. They will be missed, however, we wish them many happy years of retirement. Hopefully they will leave a few fish for the rest of us. We were saddened by the

recent loss of Gene Williams from Mississippi and extend to his family our heartfelt sympathy.

As we look back over the conference report, we find that some problems of yesteryears are still with us today. Looking into the future, we see many new opportunities for working closer together than ever before. Some of these opportunities are metrication, OIML requirements and implication of H-44, reciprocal type approval, automatic temperature compensation of petroleum products, and method of sale of commodities. Hopefully, we can continue to exchange ideas, express our individual positions, and still work toward an equitable solution for the mutual benefit of all.

The Southern Association will continue to give support and provide a leadership role to the National Conference on Weights and Measures. On behalf of the Southern Association I want to take this opportunity to thank Tom Kirby for assuming the Editor's position and publishing the Southern Newsletter. Tom is doing an outstanding job as photography editor and publisher. I am looking forward to seeing many of you in Charleston, West Virginia, at the Southern, October 19-23.

NORTHWEST WEIGHTS AND MEASURES ASSOCIATION

Presented by FRANK C. NAGELE, President and Specialist,
Weights and Measures Association, State of Michigan



It is my pleasure to be included in this portion of the program. I am here today to tell you that the Northwest Weights and Measures Association meeting for the coming year will be a joint meeting of the Michigan Association of Weights and Measures officials, and the Northwest Association. It will be the 66th Annual Conference for the Michigan officials and the 43rd annual meeting for the Northwest Association.

The annual meeting will be held in mid-April, 1981, at a location in Northern Michigan to be announced at a later date. Our officers are Vice-President, Jim O'Connor of Iowa; Secretary-Treasurer, Harold Birgy of Michigan; Sergeant-at-Arms, Al Lemke of Wisconsin; and current President, yours truly.

The member States of the Northwest Association are Iowa, Michigan, Minnesota, Nebraska, North Dakota, South Dakota, and Wisconsin. I believe the regional associations are a very good sounding board for the National Association and I would like to leave with you a thought: that the Presidents of each of the four regional associations should be members of the executive committee of this conference.

I invite you all to our joint Michigan-Northwest Conference next Spring.

NORTHEASTERN WEIGHTS AND MEASURES ASSOCIATION

Presented by THOMAS F. GEILER, Association Chairman and Sealer, Weights and Measures, Barnstable, Massachusetts



The Northeastern Weights and Measures Association 8th Annual Conference was held on April 28 through May 1, 1980, in Springfield, Illinois. This Conference was hosted by the Illinois Department of Agriculture and I would like to thank the department for their successful efforts. The Conference Chairman was Sid Colbrook, who conducted an excellent program that was both timely and educational. The program included such subjects as: The Northeastern Measurement Assurance Program, The Laboratory Auditing Program, USDA Packers and Stockyard Procedures and Regulations, Gasohol-A Motor Fuel, Regional Training Meetings, Temperature Compensation and the Effects on Consumers, Activities of the Metric Board and the Sale of Motor Fuel by Liters, The Leasing of Equipment, and a review of the tentative reports of the National Conference on Weights and Measures Committees. We were also treated to a tour of the historic sites of "The Land of Lincoln."

The Northeastern Weights and Measures Association was organized to provide a regional forum for the discussion of all problems related to Weights and Measures Laws, enforcement methods, testing procedures, and user requirements. To accomplish this, we are presently working to cooperate with the National Bureau of Standards, the National Conference on Weights and Measures, and the various State and regional Weights and Measures Associations together with Industry and Scientific Associations interested in the promotion of more uniform and effective Weights and Measures Administration.

Membership of the Northeastern Weights and Measures Association is comprised of State, county, and local Weights and Measures officials predominately from the 13 Northeastern States and industry members from throughout the United States.

I would like to take this opportunity to invite all the National Conference participants to join us in our Ninth Annual Conference in Hyannis, Massachusetts, which will be held May 11 through 14, 1981. I also urge anyone

who may wish to participate in our program to contact me before our Interim Committee Meetings which will be held at the Ben Franklin Hotel in Philadelphia, Pennsylvania, on November 19 and 20 of this year. Plans for our 1982 Conference are underway and the Pennsylvania Weights and Measures Association has agreed to host the 1982 Northeastern Weights and Measures Association Conference. Again, I would like to emphasize our desire to work with any and all organizations in the promotion of more uniform and effective Weights and Measures Administration.

NATIONAL ASSOCIATION OF STATE DEPARTMENTS
OF AGRICULTURE

Presented by JAMES B. GRANT, Executive Secretary, NASDA



On behalf of the Commissioners, Directors, and Secretaries of Agriculture of the 50 States and four territories, I would like to compliment the leadership of this conference for the excellent job that you are doing in putting this conference on. Those of us who work in agriculture here in Washington and throughout the United States understand the importance of the job you do, and the excellent contributions you are making to agricultural and consumer programs throughout the country. Also on behalf of the

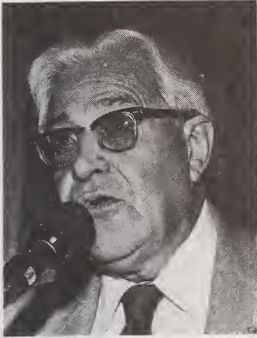
Commissioners, Directors, and Secretaries of State Departments of Agriculture, I would like to give a very special welcome to our foreign visitors here at the conference. We hope that your stay in our country will be pleasant.

I would just mention that Weights and Measures is one of our direct responsibilities in State Departments of Agriculture. We at NASDA also have an associate organization that is affiliated with this conference; that is the Weights and Measures Division of NASDA, of which the President this year is Kenneth Adcock, from Ohio. We work very closely with this organization on all Weights and Measures issues that need our attention. We call upon our people because they are our technical experts in this particular field and make a great contribution to our program.

I also would be remiss if I did not recognize my good friend Hal Wollin. We work very closely with Hal throughout the year. And we hope to continue this excellent working relationship. It is a pleasure to be here, and it is a great meeting. Please be assured that our Association will continue to work with you in every way possible.

NATIONAL SCALE MEN'S ASSOCIATION

Presented by RAYMOND C. CANFIELD, President,
NSMA, and President, Acme Scale and
Supply Company, Pittsburgh, Pennsylvania



It is incredible! But then this is America where a boy from a "peanut" farm in Georgia can become President of our great USA and a boy from a "potato" farm in western New York can become "President" of a prestigious Association involving so many of you regulatory officials, as well as many other individuals involved in our "exciting" "vibrant" weighing and measuring industry. I am truly humble and honored.

It apparently is my duty, as President of NSMA (National Scale Men's Association) to submit a sort of "State-of-the-Association" report. As so many of you are aware, by your attendance, we have just held our 61st Annual Technical Conference in San Francisco, California. We again broke all records, at that Conference, for registration and attendance, with a registration of 1845, of which 413 persons attended our Presidents Award Banquet. Eighty equipment exhibitors, with 114 booths, our largest ever, exhibited the latest "amazing" electronic and mechanical weighing units.

Our 1979-1980 President, William "Bill" Goodpaster, long active in your Conferences, again proved his organizational ability, hence these records. Certainly, while it may be a little difficult, we are working to beat these records in our 62nd Conference, to be held in Toronto, Canada, in May of 1981. We know the job we have to do, but our 1980-81 team will again break records.

We would like to extend an invitation to each and every one of you to attend our 62nd Conference, our First International Conference since 1969. It will be a honey; do not miss it.

Our present membership, involving regulatory officials, manufacturers, technicians, sales personnel, distributors, and many others involved in this industry, is a record 2374. We have set a goal of 3000 national and international members by the end of 1981.

Incidentally, we also set a record of attendance of international people in San Francisco. We had 159 persons representing 27 foreign countries in attendance.

Our new handbook, detailing all the latest in new state-of-the-art, mechanical and electronic equipment, will be ready for release by August of this year, so says our "Handbook Committee Chairman" George Welch of BLH.

Tom Stabler, of Toledo Scale Company, continues to do his usual excellent job of organizing and conducting our "Scales on Saturday" Seminars, as does that western workhorse Gene Bologna. You should attend some of these Seminars, when in your area, and be privy to the excellent educational material, for all weighing and measuring people.

We will really see some publicity for our industry this year, states our "publicity and public relations" Chairman George A. Dillon, of W. C. Dillon and Company.

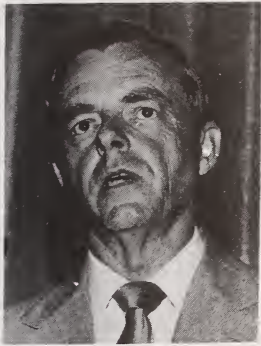
This should let you know that NSMA is alive, well, and healthy. We are going places! We invite each and every one of you to "come on along." Many of you are presently members of NSMA; all of you should be. We need your expertise and input.

Oh, did we say that we are also discussing the possibility of NSMA sponsoring a task force to determine what we in the industry can do, if anything, to help in our present national energy crisis situation. If our board endorses NSMA sponsorship of this project, on Friday next, Clayton Howard, of National Controls, Inc., will head up such a task force and hopefully other phases of the weighing industry will appoint members to this task force.

You can see we have something for everyone, and we invite all of you to join with us in our endeavors.

AMERICAN PETROLEUM INSTITUTE

Presented by HAROLD E. HARRIS, Chairman and Technical
Advisor, API Weights and Measures Technical Task
Force, Exxon Company, Houston, Texas



It is my pleasure to be included on the program to present a brief review of recent API participation in certain Weights and Measures activities. Today I will cover the status of two items, Service Station Computer Capability Survey and Table 6 Coefficient of Thermal Expansion Project.

At the request of the NCWM, API undertook a member company survey to determine the status of computer upgrading. Survey recipients were asked to provide information as of April 1, 1980. Ninety-five percent of the member companies responded and the following totals were reported:

- o Total computers requiring change or modification due to limited pricing capability 561 000
- o Total modified or changed to date 220 000 or 39%
- o About 4 percent of the total units surveyed are being utilized in the metric mode

The API survey results represent only a portion of the total computers currently in use. In an attempt to determine the status of the remaining computers, the Petroleum and Natural Gas Sector of the American National Metric Council asked three other organizations to survey their respective members: National Oil Jobbers Council, Service Station Dealers of America, and the Society of Independent Gasoline Marketers of America. The totals reported by these organizations are:

Total computers to be modified	960 000
Total computers changed to date	454 600 or 47%

If we combine all of the survey data we find the number requiring change or modification is:

	1 521 000
Total conversions as of April 1, 1980:	<u>674 600</u>
With the number remaining to be changed or converted:	846 400

In total, approximately 44 percent of the necessary conversion has been completed with 60 percent capable of metric measurement. It should be noted that the total modified represents work completed over a longer time period than from the July 1979 NCWM Policy Statement date to the April, 1980, survey date as some companies started conversion programs as early as 1978. Future API plans include another survey effort to determine December 31, 1980, status with results available for the Interim Conference in January, 1981.

Another API activity of interest to Weights and Measures is the recent API Committee on Petroleum Measurement announcement that the new Table 6, which identifies the correlation between density and coefficient of thermal expansion for petroleum products, recently received final approval for publication as a joint API-ASTM document. August 1 has been targeted as the effective date for the new table to become the official API Standard. Traditional English and metric versions will be available in both computer software and hard copy formats. Also, COPM is preparing video slide tapes to assist in implementation of the new data.

In closing, API is active in many aspects of Weights and Measures and will continue to work with State Officials and the National Conference. Let me encourage any of you to contact API Staff or members of API Weights and Measures that are attending the 65th National Conference where it is felt there is some way in which we can be of service.

INDUSTRY COMMITTEE ON PACKAGING AND LABELING

Presented by ALFRED E. JOHANSON, Chairman, ICPL, and
Counsel, Foremost-McKesson, Inc.



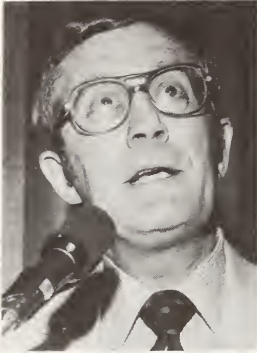
The Industry Committee on Packaging and Labeling (ICPL) is an organization of over 100 representatives of companies and trade associations in the packaged goods industries. ICPL's principal function is to serve as liaison between its members and the Conference and its committees. ICPL normally holds a meeting in conjunction with the National Conference and may also meet at the time of the interim meetings. The interests of ICPL are broad but certainly include such matters as labeling, net weight, and metric conversion.

The Industry Committee on Packaging and Labeling is eager to assist the Conference in its important work of producing high quality model laws and regulations and encouraging uniformity. We believe that open communication between industry and the Conference is mutually beneficial. ICPL compliments the Office of Weights and Measures and the Conference Officers on the organization of this Conference; we particularly appreciate their efforts to keep us advised of pending matters.

Many years of experience in weights and measures work and considerable technical and legal expertise is available through the membership of ICPL. We encourage the Conference to make use of this expertise. If we can be of assistance, please call me or Austin Rhoads, secretary of ICPL.

SCALE MANUFACTURERS ASSOCIATION

Presented by RAYMOND J. LLOYD, Executive Director,
SMA



The member companies of the Scale Manufacturers Association (SMA) value very highly this opportunity to meet with weights and measures officials from throughout the United States and the world. We consider the National Conference on Weights and Measures (NCWM) an outstanding example of government and industry working together for the common good.

We are pleased that this forum for exchange of important information has been broadened substantially in recent years to include the NCWM interim committee meetings, the conferences of the regional weights and measures associations, and our own SMA meetings.

At our recent 35th Annual Meeting, for instance, our guest speakers included Sydney D. Andrews and Stan Darsey of the Florida Weights and Measures organization and Albert D. Tholen, Harold F. Wollin, and David E. Edgerly of the National Bureau of Standards. At our Fall meeting last November, we were pleased to hear from Merle Anker of St. Louis County Weights and Measures, Daniel I. Offner of City of St. Louis Weights and Measures, and Otto K. Warnlof of the Office of Weights and Measures at NBS.

As many of you know, SMA undertook some major changes in 1976 to support this information exchange more efficiently and more effectively. The Association appointed its first staff technical director, Daryl E. Tonini, at that point and named him Chairman of its reorganized Technical Committee. As such, Daryl is technical spokesman for SMA before organizations such as the NCWM.

Now, we have taken another significant step to bolster our support of your efforts. Effective February 1, 1980, SMA appointed Hal C. Christensen as staff engineer. One of Hal's principal assignments is to broaden and strengthen SMA's liaison with the weights and measures community.

We are pleased to report that SMA's technical efforts are making progress on several fronts. Two specific programs worth special mention here are:

Tolerance Subcommittee. - This group has been expanded beyond SMA members to include representatives of other interested parties, including weights and measures officials. John J. Elengo, Jr., Chairman of the subcommittee, presented a progress report before your Committee on Specifications and Tolerances earlier this week. We are looking forward to renewing this discussion at your interim committee meetings next January and at the 66th NCWM next summer.

OIML. - Our members remain very active in working groups assigned to international standards on load cells and electronic weighing, in addition to other OIML activities. The SMA technical director was a member of the U.S. delegation at the Sixth International Conference on Legal Metrology in Washington, DC, last week.

Our most recent technical initiative is the appointment of a Subcommittee on Type Approval. Our objective here is to provide additional technical resources for your own task group and other organizations working on type approval proposals.

In concluding this presentation, SMA would like to pay special tribute to the National Conference. On behalf of SMA's member companies, it is my pleasure to present this plaque to Chairman Charles H. Vincent and Executive Secretary Harold F. Wollin, as your representatives. The plaque says:

"In recognition of outstanding service and major contributions to the United States weights and measures system over the past 75 years, the National Conference on Weights and Measures is hereby recognized and commended by the Scale Manufacturers Association. Washington, D.C., June 24, 1980."



Left to right: H. F. Wollin, R. J. Lloyd, and C. H. Vincent.

SCALE DESIGN AND WEIGHING TRENDS IN THE EIGHTIES

Presented by WALTER M. YOUNG, Vice-President,
A. H. Emery Company



I enjoyed the opportunity to reflect on the past, present, and future of the weighing industry, especially the future. I have never before taken the role of a prophet; actually, my one-year business forecasts were never so hot and now I presume to comment on what may happen over a ten-year span.

Bob Zweig, President of the Scale Manufacturers Association, recently presented his views on "metrology in the 80s" to the National Scale Men's Association

and he told the story of a President who was retiring and was looking for a successor. He had three candidates: the Vice President of Engineering, the Vice President of Sales, and the Vice President of Finance. He devised a simple test and would make a selection based on the answers. And so he called in the Vice President of Engineering and asked him how much is 2×2 ? The engineer retired, pondered the question, calculated, and returned with the answer that based on known practices and tolerances, the three sigma probability is that the answer is 4.

The President then called in the Vice President of Sales and asked him the 2×2 question. After due consideration, he replied that based upon current inflation rates, list prices and commission rates there probably was no one answer. However, his personal judgment was 4.

The President then called in the Vice President of Finance and put the 2×2 question to him. He cautiously looked around, asked whether he could close the door, and whispered "Boss, what do you want it to be?" Well, let us see what we want it to be.

The history books say that for over 5000 years, the progress of man seemed to be at a standstill. He tamed the horse around 4000 B.C., transported himself more efficiently; he used water current, wind, and muscle. Energy sources were not his to control. Suddenly in the 19th century, inanimate energy under the complete control of man came into being, and technology was jet-propelled into the 20th century. The scale industry was privileged to go along for the ride. Rapid changes took place and

the scale industry exerted itself, and took on the role of a basic industry, producing accurate weighing machinery.

I did some research to find out what the Lord had to say about metrology, and to my pleasant surprise, He had a great deal to say. He left no doubt as to where he stood on the matter of metrology and what he expected from mankind. It may be interesting to read just a few of the passages in the Bible that bear on our subject.

Daniel 5: 27 "Thou are weighed in the balance
and art found wanting."

That fellow was in big trouble.

Proverbs 11: 1 "A false balance is abomination
to the Lord, but a just weight
is His delight."

That is why we have a Weights and Measures, so the Lord does not get too angry.

Job 31: 6 "Let me be weighed in even
balance, that God may know mine
integrity."

You can bet your life that balance was supersensitive with a most unusual indicator.

Proverbs 20: 10 "God condemns fraud and injustice
in commerce."

That is pretty clear.

Deuteronomy 25: 13 "Thou shalt not have in thy bag
divers weights."

This is an interesting one. The Hebrews of old did not use coined money of standard determined weight. They weighed all the gold and silver used in trade. The standard weight used was called a "stone." Merchants were known to keep two different weights in their bag; one to sell with and one to buy with. No wonder the Lord set the record straight on this issue. And there are those that will say things have not changed all that much.

Ecclesiasticus 42 "Deliver all things in numbers and
weight; and put all in writing that
thou givest out and receivest in."

In other words, when you buy a scale, make sure it is equipped with a printer. The above is quite a mandate

and it comes from the highest authority. It certainly shows where the Lord stands on the subject of metrology.

Now, let us briefly look at the U.S.A. metrological community as it stands today:

- 1) Over 200 scale manufacturers.
- 2) Scale salesmen that number in the thousands.
- 3) Scale service technicians that number over ten thousand.
- 4) Independent scale dealers and distributors that number a few thousand.
- 5) The Weights and Measures community, with many thousands required to regulate.
- 6) Metrology laboratories, government and industry, that number in the hundreds.
- 7) Colleges and universities with metrology programs; small in number, but growing.

The above is not exact but it does place a substantial dimension on what we commonly call the "Scale Industry." It is a complex industry with many specializations and product lines. Any two scale manufacturers may be miles apart in technology, manufacturing requirements, regulatory requirements, markets.

Because of the many divergent interests within the scale community, some of the comments must necessarily be general in nature, and will not apply equally to each and every segment of the scale industry.

NOW, INTO THE 1980s

1. How will the scale manufacturing industry fare in the 1980s? Through much of the 1900s, we will say into the 70s, the scale industry hung onto the GNP; was unable to grow any faster. The reported figures are 346 million in 1977. The 1978 and 1979 figures are not available; however, industry leaders have recognized and acknowledge a more rapid growth in these years than in the past.

We forecast increased growth in the U.S. Scale Manufacturing Industry during the 80s, exceeding the rate of growth of the GNP possibly by a factor of two by the end of the decade. This growth potential will be benefitted by the following influences:

- a) The expense of direct materials in the manufacturing process demands better control,

therefore, more and better scales. This is a matter of economics.

- b) The U.S.A. conversion to the metric system will have a long-range positive impact on the industry; albeit modest.
 - c) OSHA regulations are a positive influence.
 - d) The need for many U.S. industries to modernize their processes and increase productivity.
 - e) The U.S. Scale Manufacturers will successfully increase their share of the export market.
 - f) Environmental laws are a positive influence.
 - g) The increasing ability of U.S. Scale Manufacturers to make their product do more--make it more important to the process.
2. How will individual scale product lines fare in the 80's? Almost without exception, the consensus is bullish. I see unit and dollar sales on the increase, specifically:
- a) bench and floor scales up,
 - b) counting scales to continue their sharp increase with a leveling off in the mid-eighties,
 - c) motor truck scales will continue strong through the 80s. The old line mechanical lever scale which today is the dominant version sold here in the U.S., will continue to be an important version, but with pressure from full load cell, pit and above the ground versions. This market, which numbers some 3000 units per year, is ready for real innovation; with emphasis in two areas: 1) How scales are installed. Pits cost a lot of money and usually add to the maintenance problems and costs. 2) What these units will do for the customer. The small, table top "microcomputer" will be a standard option; a great variety of software programs will be available--with a modest price and a gigantic capability.
 - d) Railroad Track Scales will increase in unit and dollar modestly through the 80s. Because of the tremendous expense involved in pit construction for the conventional

in-the-ground unit, look for the 80s to replace in-the-ground with shallow pit and above the ground versions.

- e) Tank and Hopper Scales on the increase. Mechanical versions to survive the 80s but just barely. Load cells will dominate this market.
- f) Automatic Hopper Scales, with computer control, will enjoy an excellent decade.
- g) Mail Scales, the sophisticated variety, with computer capability, will have an outstanding decade. The mail room of the future is, for all intents and purposes, at hand and will grow dramatically.
- h) Bathroom and Medical Scales with digital indication will become commonplace. Reliability will be a problem as the manufacturer struggles with the market pressure for low cost units.
- i) Continuous Weighing Units should enjoy one of their best decades ever. There are many positive influences that support this optimistic view; e.g. 1) the explosive increase in coal as a primary energy source and 2) the need to upgrade U.S.A. cement producing facilities. The energy cost per barrel of U.S.A. produced cement is substantially higher than that of the more modern facilities in Europe, especially West Germany. Both of these industries are capable of using many millions of dollars worth of continuous weighing machinery.
- j) Bagging and Packaging Scales should have a strong decade ahead. Look for the micro-processor, which has already been introduced into this market, to become the dominant method of control. Robotics, on the input and output sides of a packaging line, will become the packaging scale manufacturer's responsibility. The economics of removing direct labor cost will justify research and development in this fast growing and exciting field.
- k) Force Sensors. The use of load cells as a primary scale component came of age in the 70s. They were introduced to the scale industry in the 50s, used sparingly in the

60s, and expanded rapidly in the 70s. The 80s will be an outstanding decade for many force sensors. 1) The strain gage cell, already a mature and refined product will continue its dramatic climb as a primary scale element. Look for all sorts of new shapes and designs; round ones, square ones, donut, pancake, "S" shaped, "U" shaped, tiny ones, large ones, plates that include strain gage elements and thus become within themselves load cells capable of sensing weight. A bright future indeed. 2) The hydraulic load cell entered the realm of precision in weighing in the 70s. A full line of industrial scales with hydraulic weight sensors has been test certified and are now extensively used in Weights and Measures regulated areas. Look for the hydraulic cell to increase its penetration into the industrial market, particularly in hostile environments. Currently, this type of cell is being produced with accuracies in the order of 1 part in 14 000. The 80s will generate the techniques for more complete utilization of this high performance device. 3) While the load cells described above are the most commonly used in industry, there are others. These include force/frequency, mass/frequency, nuclear, gyroscopic transducer, the electromechanical linear variable differential transformer, and others. Each of the above has certain pluses for certain applications. The 80s will bring further refinement to these sensors. The mass/frequency and gyroscopic transducer have excellent potential for high accuracy work. The gyroscopic transducer is stated to have accuracies in the order of 1 part in 100 000. We will see more scale products built around these sensors in the years ahead.

- 1) Batching-by-Weight Systems will have a very good decade. These are big ticket sales for scale manufacturers. A \$1 million order is no longer an oddity. We are at the point where a scale manufacturer can substantially influence the process configuration: dictate the characteristics of bulk materials and select feeders, bins, conveyors, control; in fact, design and build feeders, bins, conveyors, etc.,

to meet the process objectives. At least one West Germany scale firm now offers a most complete service; from plant design to system installation. Orders have reached the 10 million range. A few select U.S. scale manufacturers will reach this rarefied plateau; it offers an excellent opportunity. More and more industries will call upon Weight Systems producers for a "complete package." The risks will remain high but the rewards for the successful ones will be substantial.

- m) Computers as a scale control product will be commonplace. Even the smallest scale companies will offer good reliable computer packages--with software packages galore.
- n) Retail Scales sales will also increase during the 80s. In recent years sales were more or less determined by supermarket start-ups. To an extent, this will continue to be true during the 80s. However, look for R & D to pay off handsomely in this field. The supermarket weigh-out systems of the 80s, both up front and in the back room, will reflect substantial change, especially in the data collection and control area. This segment of the scale industry is susceptible to challenge from imports, and it will come from Japan and other Far East countries. Watch out!

- 3. Exports - In 1978, we exported approximately \$50 000 000 worth of scales, with Canada being our largest customer, followed by Australia, Venezuela, Mexico, England, and West Germany, who are all in the low 2 to 3 million dollar range.

It may be hard to believe, but in the 50s, the U.S. supplied 40 percent of the entire world export of scales. West Germany approximately 10 percent. From that point on, it was all down hill with West Germany taking over the export leadership--and now it supplies in the order of 40 percent of the world exports, and the U.S. is under 10 percent. During the 50s and early 60s the scale capitol of the world was firmly planted in the U.S.A. Unfortunately, this is no longer so; the scale capitol of the world is now in West Germany. However, look for the U.S. export picture for scales to

improve dramatically during the 80s. There are some very positive factors at work here:

- a) A shift in international value of money will favor U.S. exports.
 - b) An increase in productivity will take place. For example, one small scale company in Connecticut invested \$200 000 in high speed computer-controlled work centers with an astounding improvement in productivity.
 - c) Further, many of the smaller scale companies will mature in the 80s and export activity will become part of their marketing program--with good results.
4. Imports - Through the 50s, 60s, and well into the 70s, the U.S. scale industry had little or no market pressure from imports. In 1968, recorded imports were 1.7 million, and by 1978, it was 16.9 million. Although this is a compounded growth rate of approximately 75 percent per year, the U.S. scale industry still exports three times more than it imports. Imports are still less than 5 percent of the total scale sales in the U.S. This happy situation will change in the coming decade. Specific product lines will be attacked first--the counting scale market--the retail scale market--bathroom and medical scales--load cells.
5. Legal Metrology - We can expect substantial change to take place in the important area of rules, regulations, and standards of Weights and Measures. As we know, in the U.S., weights and measures is a State responsibility, with the National Bureau of Standards functioning at the national level, setting standards, publishing documents, training, setting up metrology laboratories, and the National Conference on Weights and Measures, which is the single most-dominant U.S. force in legal metrology. Although change will come slowly, it nevertheless will occur. We see a steady improvement in the performance standards of the land, and acceptance of these standards by all States. A formal prototype examination program will come into being during the 80s.

The U.S. standard will have moved significantly closer to the "world" standards of the International Organization of Legal Metrology. International markets will demand that U.S. scale manufacturers comply with OIML standards--and in harmony with NBS the OIML standards will become our standards.

Whereas the number of scale manufacturers grew substantially in the 60s and 70s, we will see the 80s bring a halt to this growth. Stricter standards will apply the brakes. I fully expect that a substantial number of the present scale companies will not answer the 1990 roll call. The overall effects of legal metrology on the U.S. scale industry will be beneficial--very much so.

METRIC SYSTEM

Conversion to the metric system will continue to be painfully slow, and it appears that we will be struggling with it throughout the remaining years of the 20th century.

THE SCALE DEALERS

The single largest and most powerful sales and service force in the U.S. is the community of independent scale dealers. By sheer numbers, they tower over even the largest U.S. scale company. The future looks very good for their continued prosperity and growth. The scale entrepreneur will find opportunities galore in this branch of the scale industry. He will need to be a scaleman, a service technician, a businessman. But above all, he will need to be a man of integrity.

The opportunity will also be there to be either a specialist in a specific area or a generalist, operating over a broad band of scale products and markets. The growth of the scale dealers will exceed that of the companies with their own sales and service force, by a very significant amount.

PEOPLE WITHIN THE SCALE COMMUNITY

I am most optimistic about the people requirement during the 80s. Needed in substantially larger numbers will be salesmen, service technicians, engineers, technicians, machinists, computer experts, etc.

PRODUCT RELIABILITY

The introduction of electronics into the scale industry certainly did not produce a more reliable product. Quite the contrary. Product reliability suffered. The 70s saw some improvement in this area but by no means has reliability reached acceptable levels. The 80s will demand more reliability from scales. The market will pressure for improved warranties.

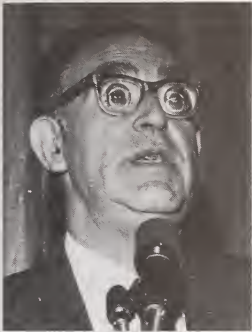
SUMMARY

The scale industry is alive and well, with a potentially explosive decade ahead. It has come of age. The pressure placed upon it to fulfill its vital role is increasing, and with it will come opportunities galore. You need only pick your spot. During my 30 years in the scale industry, I witnessed phenomenal change, and the extent of change within the industry has been accelerating; that is, some change in the 50s, still more in the 60s, and much more in the 70s.

The 80s will be the most exciting decade yet. We may even get to know the difference between metrology and meteorology.

WEIGHTS AND MEASURES REGULATIONS
THE EUROPEAN SCENE IN THE EIGHTIES

Presented by G. F. HODSMAN
Avery Research Administration Ltd.
Birmingham, England



This paper describes the way in which weights and measures regulations are being harmonized in Europe and how the manufacturers and metrologists collaborate on an international level. The way in which the harmonized regulations operate and some of the problems which are also considered.

COMITE EUROPEEN DES CONSTRUCTEURS D'INSTRUMENTS DE
PESAGE (CECIP)

This organization, founded in May 1959, represents virtually the entire weighing machine industry of Western Europe. The members of CECIP comprise the weighing machine industries of nine countries: Belgium, Denmark, France, Germany, Italy, Netherlands, Sweden, Switzerland, and United Kingdom. Sweden and Switzerland are not members of the European Economic Community (EEC) so CECIP has a wider representation than simply the EEC countries.

The National Federation of weighing machine manufacturers in each country is a member of CECIP. It is not possible for an individual manufacturer to be a member.

The policy of CECIP is controlled by a General Assembly, which meets annually in the member countries in rotation and to which each member country sends delegates. A Bureau (or Committee) of the Officers deals with the administration during the year. The Secretariat and office is located in Paris.

The work of CECIP is conducted in a series of "Working Groups" which deal with specific topics; e.g., Non-Automatic Weighing Machines, Legal Metrology, Electronic Systems, Ticketing, Checkweighers, etc.

Working Groups can be formed to deal with specific problems as they arise. These groups, comprising experts from the member countries, meet as necessary in Paris and

form the focal point for links with the EEC and OIML. Through CECIP, therefore, every European weighing machine manufacturer has the opportunity of influencing the formulation and operation of international weighing machine regulations.

THE EUROPEAN ECONOMIC COMMUNITY (EEC)

OBJECTIVES

A principal objective of the EEC is to establish a "Common Market" in which the manufactured goods of all the member countries can circulate freely without restriction. The financial restrictions have long since been eliminated and no customs duties are applied when goods pass from one country to another. However, this does not ensure freedom in our particular area. Each country has its own weights and measures regulations which are mostly quite different and, of course, written in different languages. To sell a weighing machine in an EEC country it was necessary to secure approval and stamping in that country, which meant making different models for each country. The Community had, therefore, to institute a program of "Harmonization" to eliminate these so-called Technical Barriers to Trade. It has been a formidable operation and is still far from complete. The process is being undertaken under Article 100 of the Treaty of Rome.

HARMONIZATION OF REGULATIONS

The EEC Commission which is the "Civil Service" of the Community is advised in this task by Working Groups. If, for example, the regulations for Checkweighers are to be harmonized, the Commission convenes a Group of Metrological experts from the member states under a Commission official as Chairman. Their job is to prepare a draft "Directive" embodying a set of regulations likely to be acceptable to all. This is not a simple task and is very time consuming. Until recently the manufacturers had little opportunity to influence this process.

However, CECIP is now increasingly being invited by the Commission to participate in the work of these Groups and delegates from the corresponding CECIP Working Group (e.g., checkweighers) are beginning to participate more fully in the work.

In due time, the Commission presents the proposals to the Council which provides the political control of the EEC with representation at Ministerial level. The Council is first required to submit the proposals to two bodies for an opinion: the European Parliament and the

Economic and Social Committee (ECOSOC). The Parliament comprises members elected by the population of the member countries and usually has little to say about specialized technical Directives. The ECOSOC comprises representatives from Industry, Trades Unions, and Consumers and often makes strong criticisms of proposed Directives.

After further consultations at Council and Commission level, and if all goes well, the Council eventually issues the Directive, (the decision of the Council must be unanimous). Under the Treaty, every member state must implement the provisions of the Directive by National Legislation, usually within 18 months.

In this way a harmonized set of regulations (e.g., for checkweighers) becomes the law in each member country. It is important to realize, however, that the EEC regulations sit alongside the existing national laws and do not replace them. Harmonized regulations are now in operation for nonautomatic weighing machines, belt-weighers, checkweighers, weights, prepacks, among many others in different areas.

EEC TYPE APPROVAL AND VERIFICATION

The first Directive of interest to weighing machine manufacturers, called the "Directive Cadre", set up the whole framework for approval of weighing and measuring equipment.

A manufacturer can submit a new machine to the Metrological Service of any member state (not necessarily his own country). The service will examine the machine to see whether it complies with all the requirements of the harmonized regulations for that type of equipment (e.g., checkweighers). If satisfied, the service issues an EEC Approval Certificate and notifies all the other member Services. The manufacturer can now submit production machines to his local Weights and Measures official usually at his factory, who will check general conformity with the approved type and check weighing accuracy. He will then apply an e-stamp to each machine. This e-stamp is the European passport. The machine can be sold and used for trade in any member country without any further control whatsoever by local officials in that country. The machine can only be prohibited if it subsequently exhibits weighing errors outside the "in-service" tolerances, usually twice the verification tolerance. In this way the objective of the EEC of creating a single free Common Market is achieved.

SOME PROBLEMS

The procedure outlined above does not operate without creating difficulties for both metrological Services and manufacturers. These difficulties are currently exercising the minds of the Commission and CECIP and are problems for which solutions must be found if the objectives are to be fully realized in practice.

INTERPRETATION

This is the most serious difficulty whose full significance is just beginning to be realized. The Directives are issued in all the Community languages: French, Danish, German, Italian, Dutch, and English. All the texts are of equal validity. The Council goes to considerable trouble to see that the texts are exactly equivalent at all points, but clearly, with the nuances of different languages, this is an impossible task. In examining for type approval, each metrological service may take a different view of the meaning of a particular regulation. One service could accept what another service will reject. Even without the language problem, it is perhaps too much to expect nine metrological services to have exactly the same view of every aspect of very detailed technical regulations.

At the request of CECIP, the Commission has begun work on the important nonautomatic weighing machine directive, to identify and eliminate interpretation problems. The size and difficulty of this task is only now beginning to be appreciated. Perhaps time and experience will lead to a greater uniformity of view among the services; as manufacturers we think this is vital if unfair competition is to be avoided.

A European Type Approval Laboratory would eliminate these interpretation problems, since there would be only one source of EEC approval. Europe, unfortunately, is not yet ready for such an innovation since the national metrological Services still jealously guard their right to issue approvals. However, unless the Commission and the metrological services can solve the interpretation problem, such a step may well be the only solution if unfair competition is to be avoided.

ELECTRONIC SYSTEMS

The Commission has been grappling for over six years with the problem of the regulations which should apply to weighing and measuring equipment incorporating electronics.

No agreement has yet been reached or seems imminent. There are broadly two opposing views which the Commission has not yet been able to fully reconcile. Some countries argue that an electronic machine must always indicate correctly (within tolerance). Any electrical or radio interference or failure of components that alters the reading must result in the machine shutting down and not being capable of operation until the fault has been rectified or interference eliminated. The opposing view argues that this is too harsh, increases costs, and is unnecessary for consumer protection.

As a result of this difficulty no EEC approvals can be given for any machine incorporating electronics, and since virtually all new machines incorporate electronics, the harmonization permitted in theory by all the adopted Directives is largely inoperative. A solution to this problem must be found if the work of the Community in eliminating technical barriers to trade is to have any meaning.

ADAPTATION TO TECHNICAL PROGRESS

Technology is changing ever more rapidly. New ideas emerge, which conflict with requirements in the harmonized regulations. The EEC has a procedure for adapting Directives to take account of technical progress. Unfortunately it operates slowly. The full implications of this have not yet been felt since most developments are electronic and not, therefore, now eligible for EEC approval. Once they are, the community will be faced with the need to find a way of adapting regulations very quickly to suit new techniques to avoid restricting the activities of the innovative manufacturer.

DELAYS IN TYPE APPROVAL

There are serious delays in obtaining type approval in some member states. In some cases this can exceed two years and places an intolerable burden on manufacturers whose access to the market with new ideas is severely restricted. Indeed the technology may be almost obsolete by the time the manufacturer is free to market. The problem is becoming more serious as equipment becomes more complex and involves longer type approval examination.

THIRD COUNTRIES

A rather delicate problem has arisen more recently. The manufacturer from outside Europe has free and unrestricted access to the EEC approval procedure in exactly

the same way as a manufacturer in a member country. He is thus able to make one model which will be acceptable to all nine countries, instead of, as previously, having to make nine more or less different models to meet the regulations of the individual countries. He has access to a single market of over 250 million people.

In CECIP we believe that this is right and we are prepared to meet this competition, fair and square. We do say, however, we think fairly, that in return there should be reciprocity and that no unreasonable restrictions should be imposed on the free sale of our e-stamped machines in third countries. In many countries there is little problem but there are still troublesome areas. The EEC Council is now looking at ways of ensuring that true reciprocity is encouraged and achieved.

RELATIONS WITH OIML

CECIP collaborates very closely with the appropriate working groups in OIML, which frame the International Recommendations and which are eventually adopted at an International Conference such as the one this year in Washington.

CECIP is concerned to see that the OIML regulations and EEC Directives on the same equipment march in step. This has been one of the successes of international cooperation. To date OIML and EEC requirements are very closely harmonized.

CONCLUSIONS AND EXPECTATIONS FOR THE EIGHTIES

It is easy to be critical of the slow progress made with harmonization by EEC and OIML. The problems of securing agreement between countries with widely differing cultures, legal backgrounds, and languages are immense. In a relatively few years, solid progress has been made and already manufacturers are beginning to see the benefits of less diverse European and world-wide regulations. We are some way from a single set of regulations applicable everywhere, but by the end of the eighties, that goal may well be in sight, if not fully achieved.

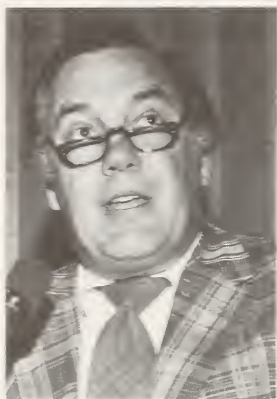
It is sometimes said, why do we have all these regulations? Why do we have type approval and stamping? Why control weighing machines except in a very elementary way? Control the product that is weighed (or measured), and apply severe penalties for short weight. This is enough. The CECIP view on this is clear and unequivocal. We believe that strict, but sound regulations are good

for both the industry and the consumer. We sometimes disagree with some of the detail which appears in harmonized regulations, but never with the need for the firm control they provide.

The author is indebted to GEC-Averys Ltd. of the United Kingdom, for facilities in connection with the preparation and presentation of this paper.

THE CONSUMER MOVEMENT OF THE 1980s - WHAT WE
WOULD LIKE TO SEE FROM WEIGHTS AND MEASURES

Presented by LOUIS S. MEYER, Director,
Conference of Consumer Organizations, and Faculty,
Edinboro State College



I would like to thank the National Conference for inviting me to be here today at your Sixty-Fifth National Conference, to address a few ideas regarding consumer expectations as we move into the '80s. However, I do not plan to speak for 30 minutes but, rather, I would like to suggest several significant issues that will impact on the marketplace in the decade ahead as identified by numerous consumer representatives and advocates, and then turn to a few weights and measures related concerns as viewed by these representatives.

I feel it very important that broad marketplace issues should be identified, whether directly related to weights and measures or not, because every agency, company, profession, occupation, or industry must recognize that it cannot withdraw into its own arena of operation and neglect other peripheral problems that impact on the marketplace.

In this regard I would call your attention to a situation involving reconstituted milk and the contention by several Washington public interest groups that consumers, particularly low income consumers, could save 19¢ a gallon on reconstituted milk. However, what they fail to take into account is what this program might do to the income of small dairy farmers. We might well end up with many of these farmers being driven out of business and thus driving milk prices much higher than the 19¢ per gallon which proponents say will be saved through use of the reconstituted milk. In many respects the consumer movement has been overly price-oriented and we must see other aspects of the issues, related problems as well as those that affect us only directly. For too long, too many people have contented themselves by thinking that the other problem belonged to someone else to solve. For too long government agencies, industries, and a wide variety of occupations and professions have been satisfied by thinking that only the utility company, the airline, the supermarket chain, the auto repair shop or service station, or the local medical center need be given consideration regarding testifying at hearings incident to legislation and

regulation affecting those entities. After all, what does the consumer, the public, know about such matters as utility rates and nuclear power, about airline schedules, lost baggage, and overbooking flights; about the universal product code, the direct correlation between high food advertising costs and the nutritional worthlessness of the commodity and shortweighing of produce; after all, what does the consumer know about defective gear shift slippage and Chevy engines in Oldsmobiles, or about exorbitant in-house sweetheart contracts held by hospital pathologists, anaesthesiologists, and radiologists to the tune of hundreds of thousands of dollars in health care costs paid for by the consumer? Historically, there has been an attitude quite rampant in the land that the general public, the consumer, does not know and does not really have the right to know; that this right is conveyed upon the government official, political appointee, corporate executive, and professionals and occupationists in our economic system. These are the sacred cows to whom we must supposedly defer.

I am suggesting to you that this decades-old policy and belief that the system can harbor a business-as-usual attitude is as outdated as believing that we can fight metric and win. The fact of the matter is that no one can rest assured that he or she is exempt from assisting in the solution of marketplace issues that transcend weights and measures. Just as some American corporations, trade associations, and industries are being drawn into the joint decision-making structures between themselves and consumerists, so, indeed, shall occupations and professions come to realize that they must sit down with public or consumer representatives--those who work with consumer groups and have a bona fide constituency--and early on in the game identify the issues and problems that must be resolved.

I fully realize there are those who will disagree and fight this idea. So be it. If confrontation, adversarial relationships, or unreasonable attitudes are what such people desire, I am sure there are those from within the public sector who will accommodate such feelings. For one, I believe such a course of action will only intensify the lack of problem resolution that is so important in the marketplace today.

What does all of this mean to you as public officials and others in the private sector involved in weights and measures? First, I believe it means that you must be attuned to the issues that are being identified by consumer representatives as the key problems likely to surface in the months and years ahead. I do not mean only those

issues that relate directly to your occupation or profession; but, rather, the many others that are outside your jurisdiction--or seem to be today. The interrelationship of direct and indirect issues must be recognized if the problems are to be resolved, irrespective of the difficulty in confronting such issues.

I am reminded of a conference at which I spoke last November. I was asked to give a consumer or public perspective on quality assurance in the hospital laboratory. I decided to go beyond telling them that the consumer-patient would be satisfied if the lab vials were kept clean and the floor swept, and address numerous significant issues such as lab personnel training programs, duplicative tests performed, technological accuracy of tests, pathologist contracts that are built around a percentage of the take and their resultant effect on quality assurance, and a host of other related issues. Needless to say, this is not what they had in mind and I was immediately accused of raising issues that I had no business raising. (I think what really bothered them was the fact that my remarks were to be printed in the final Conference Proceedings for all the world to see!)

And so I suggest to you that you become aware, if you are not already so, of what is bothering consumers as we enter the 1980s: such things as low income consumer issues in the marketplace, prospective changes in our health care system, energy policies as they impact on consumer interests, public participation by public groups, the consumer stake in regulatory reform, the impact of multinational corporations on consumer interests, the long-term effect of the computerized scanner and UPC in the supermarket, the alternative marketing systems being established across the country and their implications, the move to metric and how it can negatively affect consumers unless we make ourselves aware of the potential problems and, of course, other select issues. But, in the process recognize how weights and measures may be a part of these issues.

How do you gain an understanding of the issues? First, I believe, by making yourselves openly available to consumer groups in your States and communities. I think in all sectors we must involve others affected by our activities and talk less to ourselves. I appreciate the fact that many weights and measures offices and operations are understaffed and ill-equipped to do the job entrusted to you decades ago. But, all the more reason to make contact with public interest groups in the community. A pertinent question is, when was the last time you moved out of your State or local office and

sought out consumer groups to discuss what they viewed as problems in the weights and measures arena? I would like to believe last week, but I am afraid it did not happen. And why not? Which of your offices is overbudgeted so that you are financially solid with no worries? Very few, if any! Which of your offices is overstaffed with no personnel concerns? Very few, if any! My point is that you have natural allegiances with concerned consumers upon which alliances and coalitions can be built, and as you do so, strengthen the legislative, regulatory, and constitutional responsibilities of your offices, such as the Model State Method of Sale of Commodities Regulation (Pennsylvania, in many places, has as many as 7-9 different size loaves of bread on supermarket shelves). I know of no other matter so compelling in the decade ahead as this need to establish public dialogue in the pursuit of issue resolution. In this regard, I commend the Report of the Committee on Liaison and particularly Section 502, "Position Development and Advocacy;" it is important to get input from other quarters.

Second, an understanding of the issues is also gained by attending consumer conferences and workshops, where you have an opportunity to meet consumer representatives and discuss their perspectives of mutual concerns. Two cases in point: How many of you attended the Eastern Consumer Conference at Harrisburg, PA, three weeks ago? Or the Conference of Consumer Organizations (COCO) Annual Conference on Regulatory Reform at Madison, WI, last October where Al Tholen spoke? Aside from the fact that some of you did not know about these conferences, most State offices received notices, and few were represented.

Similarly, consumer representatives are an important adjunct to meetings such as this, but they must receive financial assistance to get here. Comments from consumer representatives on food lifestyles, energy concerns, and weights and measures problems would, I think, be quite helpful to you. I strongly urge the Department of Commerce to undertake an examination of prospective ways by which greater consumer input can be obtained at such conferences as this. In those cases where revamping or amending of State laws is being considered, pre-amendment meetings should be held with representation from the consumer sector.

With these ideas in mind, let me turn to a few concerns consumer representatives have about weights and measures. First, is the absolute necessity of weights and measures investigators and other officials to view themselves as consumer protection people. It is all well and good to recognize weights and measures as the oldest

of the consumer protection professions; it is something else to operate and respond as such on a day-to-day basis in the marketplace. And this means many things--such as no wearing of campaign buttons while enforcing laws; or holding conferences at any level--Federal, State, or local, where the hospitality room is not stocked by local merchants who are subject to weights and measures inspections.

In order to operate effectively and in the consumers' best interest, weights and measures must be taken out of the clutches of politics. While I realize that many inspectors and other local and State officials will strongly deny any consideration of political ramifications in their jobs, the evidence is adequately strong to point up the need to develop a professionally trained cadre of weights and measures inspectors, sealers, and other officials. This means that the time is at hand when the Federal training of inspectors would be considered, including the required technical training, utilization of textbooks, experts, and facilities. In other words, a major part of weights and measures training should be standardized.

At the present time the professionalism of weights and measures varies widely. In some States the tradition is solid and the performance a good one; law enforcement is handled well; complaint handling is good. In other States the reverse is true with little knowledge as to how to swear out a citation; little pre-package checking; poor equipment; and other problems. Granted, as pointed out by one consumer activist and former county official, much of the problem stems from county operations as contrasted to State operations. And considering the sophistication of coming technological needs, many questions have been raised as to the capability of counties (except in some circumstances) to handle the weights and measures responsibilities.

Closely related to this is the need to reexamine the old adage that that government is best that is closest to the people. I am not suggesting that the Federal bureaucracy is a cure-all for our extensive list of societal ills. But I think there are questions to raise about the effectiveness of business at the local level on weights and measures enforcement. This is not strange. If anyone questions the idea, I suggest you examine the extent to which local zoning has become a marketable commodity. We are close to our neighbors and public officials and that closeness can often breed questionable decision-making. It is simply a fact of economic, social, and political life.

Similarly, consumers are concerned about enforcement of weights and measures laws in those locations that are not established places of business. I refer to such operations as the sale of cord wood where the commodity is sold by every nonlegal quantity known to man. Such transactions are elusive to track down, while the consumer is taken by slick operators. At the same time, this kind of sale will become increasingly important as wood is utilized in greater quantities by consumers.

There is a strong feeling among many aware consumers that much of what is needed would be found in specialized training programs of State inspectors, with the elimination of State and county duplication where it exists. It also means a form of civil service operation that, to a large extent, is removed from politics. As one consumer activist emphasized--a former sealer--numbers 1-5 on my list of priorities are Federal government training of inspectors with the personnel becoming a cadre of civil servants. The real experts, facilities, and programming capabilities are there and they should be utilized to their fullest extent if weights and measures offices are to provide the consumer protection intended.

The decade ahead is going to bring new technologies in many areas affecting consumers. These will demand increasing competencies and expertise with greater expectations on the part of consumers for greater uniformity and consistency in enforcement policies and practices. It is going to mean the need for extensive educational programs, formal and informal, to assist consumers in better understanding these technologies. Nowhere will this be more demanding than in metric conversion. In my considered judgment, as the complexities of the marketplace increase, the aggravations of the consumer will compound themselves. As this develops, frustration takes over and the forward movement of conversion will be lost.

Not only is the educational or informational aspect important in metric, but equally significant is the need to work with consumer organizations in providing weights and measures information to the public. What are the laws in any State? What can the consumer do? Some time ago I went into the Edinboro, PA, IGA and noticed that all the in-house prepackaged potatoes in a certain group of thirty packages all weighed the same--3 pounds--and all cost the same--87¢. Now, I am not sure if any of you were brought up on a farm where they grew potatoes; but if you were, you know they do not grow that way. And in checking the packages we found shortweighing of up to 3-4 ounces; e.g., 2 lb, 14 oz; 2 lb, 13 oz; 2 lb 12 oz. I am suggesting to you that regulations and policies governing

such problems are not well known to consumers, and offices of weights and measures must assist in the education of consumers in order to counter the frustration and aggravation in the marketplace.

So, I must go back to the beginning. As Lewis Carroll said in Alice in Wonderland, "The place to begin is at the beginning". After almost five years of joint dialogue between various companies and industries I am convinced that we begin the solution of problems in the 1980s by recognizing the tremendous public-marketplace responsibility of those involved in weights and measures.

Your budgets and legislative-regulatory capabilities will need to be strengthened in the months ahead, needs that can draw from coalition-building within communities and the States. Support is there, but it is up to everyone in this room to seek it out, and I refer to public support to bring the obligations and responsibilities of weights and measures operations to the forefront of consumer protection, where it belongs.

It will not be easy, breaking some of the old molds and creating new ones. But the marketplace is changing and that is what we will be witnessing through the decade of the 1980s, the "Decade of the Marketplace." It will mean greater consumer awareness, sophistication, and, yes, at times, demands. But it is also bringing about a greater recognition on the part of business and industry of what is meant by societal responsibilities, and their acceptance of such responsibilities, starting with the realization that the corporate franchise was not somehow ordained by God for their benefit, but rather it was granted by the people for the benefit of the public. More and more corporate types are coming to recognize this.

But easy or not, it must be done, for to do otherwise will mean the court of last resort to the consumer, regulatory, and legislative action. It is your choice, it is our choice, to do the job that needs doing, to protect the consuming public. It may mean rocking the boat a bit, but it will not be the first time that competent public officials were accused of that.

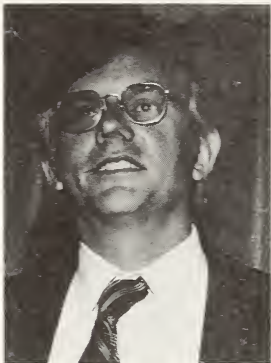
Eighty-five years ago Colorado produced a great public official whom some of you may remember, the great inland populist, Mary E. Lease, who, during some very trying times, said that what this country needs is to raise more hell and less corn. And I believe she was right, but it must be effective hell-raising by committed and knowledgeable people who understand the issues and

worry not about creating waves. It cannot be left to someone else; it must be our concern to effect positive public interest change in the decade ahead, and do it as we interest and reinterest people--consumers--in the vitality and historic responsibility of the mission of weights and measures in the months to come.

COMPUTERS, MICROELECTRONICS, AND PEOPLE

Presented by MICHAEL W. BLASGEN, Technical Advisor
to the Chief Scientist, IBM Corporation, Washington, DC

INTRODUCTION



I have recently learned the meaning of the word "ubiquitous," as in "the ubiquitous computer." I have attended conferences and Congressional hearings on this subject, and the media find it irresistible. The cover story of this week's Newsweek is "Machines That Think," subtitled "And Man Created The Chip." The article states that "a new generation of electronic servants has been spawned--and they will change the way we all live." Is all this excitement justified?

Computer and micro-electronics can be expected to find numerous applications, and the effects on people are not always understood. Yesterday's Wall Street Journal has a front page article on management resistance to an increasingly automated office. Articles like this serve to remind us that, just as throwing money at a problem does not always fix it, so throwing silicon will not always help. I am reminded of a cartoon showing the king at the roundtable saying to his knights: "Since all the king's horses and all the king's men couldn't solve the problem, I say we need more horses and more men."

WEIGHTS AND MEASURES

You might ask what all this has to do with weights and measures, and that is a good question. Although I am not an expert on metrology, let me suggest some ways that computers relate to measurement.

First, the computer is an essential tool in extending the science of metrology. The computer has an unparalleled ability to deal with low signal-to-noise environments, to cope with nonlinearities, and, perhaps most importantly, to patiently monitor input from as many sensors as may be needed to avoid systematic error.

These advancements in the science of metrology are in turn critical to the continued progress of electronics. In IBM, for example, we must control tolerances in manufacturing to an extreme degree (a few atoms of thickness in

some cases) and support parts interchangeability for products built in two dozen countries, sold and serviced in ten dozen countries, and built with the help of 80 000 subcontractors worldwide.

As a third relationship between computers and measurement, computers offer a path of progress in measurement technology. You would, of course, understand this better than I. One can expect to see our ubiquitous computer packaged inside measuring devices of all kinds. It is in this sense that computers will be around us. There is a useful analogy here with electric motors.

If you visit in Washington, there is a wonderful exhibit entitled "1876" at the Smithsonian. There you will see that, 100 years ago, rotary motion for a factory was centrally generated and then distributed by a complex of belts, pulleys, and drive shafts. Today electrical motors are found everywhere. Someone has counted 68 electric motors in his house. You do not think of them as motors, of course, but as shavers and drills and air conditioners. In the same way, computers will find their way into homes and factories, embodied in other useful devices. "Home computers" will be only a tiny fraction of the total. I expect most measurement devices will contain computers in the future.

SMALL IS BEAUTIFUL

It is useful to review some of the key developments in computers and microelectronics. In almost no other area is it so clear that "small is beautiful." In the computer business, smaller normally means cheaper, faster, simpler, and better, although sometimes we fail to achieve the goal of simplicity. Making things smaller has managed to make computers cheaper at the rate of 20 percent per year. This is true whether you measure the cost of computations, the cost of main storage, or the cost of auxiliary storage. In every case there has been an exponential decrease in the cost of these things. This has been true for over twenty years. Miniaturization is the key to this achievement. IBM manufactures a 64K RAM chip, containing 155 000 devices on a chip of silicon less than a centimeter on a side. Two hundred of these are fabricated at a time on a single 3 1/4 inch wafer of silicon. Thus, this single wafer has the ability to store 13 million bits of information.

The cost of manufacturing these chips depends on the technical complexity of the manufacturing process but does not depend on the circuit density. That is why "small is beautiful."

DISK STORAGE

The desirability of small size is not limited simply to electronics. In the case of disk storage, we have seen a similar exponential improvement in storage density causing a similar reduction in cost to the user. In the late fifties we stored approximately ten bits per square millimeter on the surface of a disk, whereas today we can store approximately 10 000 bits per square millimeter. The key to detecting such small changes in the magnetization of the oxide coding on the disk is to fly the head very, very close to the surface. In today's devices we fly the head at approximately 20 millionths of an inch from the surface and when one considers how rough the surface of the disk is, this is roughly equivalent to flying an airplane between San Francisco and Denver at 600 miles an hour at 100 feet above the ground.

PRINTING

Even in printers miniaturization is the key . For example, in ink jet printing the ability to form regular droplets of ink depends on our ability to fabricate extremely small nozzles which produce the droplets.

SOFTWARE

Behind these technological advances lies some good news and some bad news. The good news is that computers do, in fact, contribute to everyone's productivity and therefore, we can hope to deal with the inexorable rise in wages and prices with productivity enhancements induced by the use of computers and electronics. The bad news is that as computing capacity has dropped in cost, the price of people, in particular, data processing professionals, is rising in cost. And it is these data processing professionals who produce software, the production of which is, at least so far, a comparatively labor intensive task.

Software has risen in importance in the last 20 years. In the 50s a negligible fraction of the cost of installation was associated with maintaining and developing software. Today, if the vendors and installation software costs are considered, some 85 percent of the cost of maintaining the installation is associated with the software, and only 15 percent is associated with the hardware. One aspect of this is the rise in the amount of the systems control programming required to run a sophisticated central computation complex. In the early 70s there were perhaps 3 to 4 million lines of programming whereas today we are looking at 25 million lines.

Of course, this software does buy you something. As needs arose, software has been used to address the needs of users. To enhance hardware utilization, we began building operating systems with multiprogramming. When programmer productivity became a problem, interactive timesharing systems were developed. When programs and applications needed relief from constraints, virtual storage was developed. And finally we are moving into a database/data communications environment where the reliance on software has increased even further.

NEW APPLICATIONS

In the future, we can look to new applications of computing. These applications will include image capability; the ability to handle speech, and ever more sophisticated communication networks. With respect to speech, I cite the opinion of a bank vice president who, with his computer unplugged and facing the wall, said to a Wall Street Journal reporter: "I would much rather talk than write." His complaint, of course, is that today's terminals require typing. One solution to his problem, speech recognition, is on the horizon. In fact, today, isolated word recognition is easy. For applications such as inventory and process control the ability to recognize words such as "stop," "start," "slow," "fast," in isolation is a relatively straightforward task. It is much more difficult to recognize continuous speech, as in "put this in the fifth box from the left." However, in experiments carried out at the IBM Research Laboratory in Yorktown Heights, New York, successful recognition of rather complex sentences was done recently. An example sentence is: "Rod eighteen may be any of the known crystalline lasing materials such as ruby, or, alternatively, the active material could be any of the lasing gases or any of the injection type lasing media." Sentences of this form were successfully recognized with an accuracy exceeding 90 percent by programs developed at that laboratory. Of course, it did take quite a bit of computer time. In fact, what might take the speaker ten to twenty seconds to say took approximately two hours of computation to recognize.

PRODUCTIVITY

The thing that makes all this work worthwhile is, of course, the enhancement of productivity. Investment in computers and computer technology can pay off in enhanced productivity. For example, although in the U.S. as a whole there are approximately fifty employees per computer terminal, in IBM there are only five employees per terminal. Peter Drucker considers this the key to the "reindustrialization" of America. He says, "The most important approach

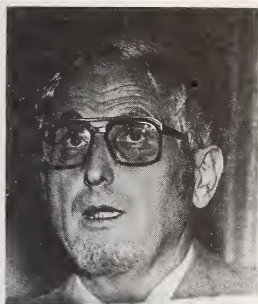
to reindustrialization is the integration of the computer into the machine, the tool, the instrument. This development is proceeding so fast and furiously that some observers speak of a third industrial revolution."

For this "revolution" to be successful, there are some things to look out for. The limitations of computers must be recognized and dealt with. Computers and associated microelectronics are the most important tools developed to help mankind in recent history, but they are only tools.

With respect to the limitations of these tools, there are two techniques available to us. We can try to remove or reduce limitations by carrying out computer science research, and at the same time, we can try to extend the usefulness of the computer despite its limitations by doing human factors research. Only through outstanding research, both in human factors and in computer science, can our hopes for an enhanced environment be achieved.

INTERDEPENDENCE OF METROLOGY, STANDARDIZATION, AND QUALITY ASSURANCE

Presented by PROFESSOR DR. ING. WALTER MUHE,
Physikalisch-Technische Bundesanstalt,
Federal Republic of Germany



Let me start with two general remarks: First of all, when there is something doubtful or not acceptable in my speech, please believe that this could result from my limited knowledge of your language. And second, I feel very privileged to be accepted as a speaker at your remarkable National Conference with the general topic "Expectations for the Eighties."

My short talk has to deal with the interaction and interference among metrology, standardization, and quality assurance. This interdependence has been discussed in past years in several international seminars or workshops. During the next decade, however, we must expect an increasing importance of metrology and standardization as basic means for quality assurance. This may concern "product quality" expressed by measurable quantities like accuracy, reliability, stability, reproducibility, or durability. This may also concern "quality of life" ensured, e.g., by better medical diagnostics and therapeutics, by pollution control, and by improved safety in traffic or at dangerous working places.

Furthermore, increasing activities should be expected to diminish trade barriers caused by different metrological standards in different countries. In this connection, overlapping of work must be avoided, and a still better cooperation between international metrology organizations (like OIML, IMEKO, and CGPM) on the one hand and international standards organizations like ISO, IEC, or ICUMSA) on the other hand, is desirable. The following remarks are addressed to only a few aspects of these very complex problems.

HISTORICAL RELATION BETWEEN METROLOGY AND STANDARDIZATION

In the earliest national or political communities, thousands of years ago, there existed some standardized rules for measurement [1,2]¹. It was already known that

¹Figures in brackets indicate the literature references at the end of this paper.

even primitive manual production and all exchange of goods must be based on comparisons and on comparable physical units. So one may find more or less clear ideas for some simple measurements, especially for dimensional quantities (length, area, volume), for time, and for weight (mass). Comparative units and standards were derived from proportions or abilities of human beings (ell, foot, daywork) or from systematic phenomena of the environment (earth's rotation, sun's altitude).

Weights and measures requirements of later centuries up to the Middle Ages were developed from such observations and conventions of the ancient cultures. The local or regional diversities of metrological reference standards, however, caused remarkable uncertainties and difficulties in trade and production. Accordingly, many efforts were made to develop generally acceptable reference standards and to fix their realization and their use by State regulations. Even statistical methods were described as shown by an illustration of an old German book published more than 400 years ago (fig. 1).



Figure 1. Setting up a length standard by statistical averaging. Ancient Graph from the book "Geometrey," published 1575 in Germany by Jakob Koebel.

In this figure the author shows a way to determine a "standardized foot" by taking the mean value of the feet of a number of persons, just as they may come from church,

i.e., by adding the feet to yield a distance and then dividing by the number of persons. To speak in the terminology of modern statistical quality control: By a sampling plan from a lot of individuals a sample was taken to find out the statistical mean and the dispersion values. But the specialists for statistical quality control know that good decisions, i.e., about the standard deviation or the confidence level could only be made if the distribution curve is well known and preferably is a normal distribution.

A new situation arose in metrology and measurement techniques in the 19th century when several countries became quickly industrialized. Mass production and interchangeability of technical components depended greatly upon uniformity and precision in production within narrow metrological tolerances. This need was met by two measures: 1) Increasing international cooperation in the realization of basic physical units and standards resulted in 1875 in an international treaty, the Meter Convention, and in the establishment of a scientific laboratory, the "Bureau International des Poids et Mesures." This organization internationally coordinates measurements in the whole field of basic physical units and constants and standard calibration procedures. 2) The establishment of national metrological laboratories doing research work in basic metrology and well equipped with calibration and testing facilities for science and industry was another important measure. One of the first institutes of this kind was the "Physikalisch-Technische Reichsanstalt," which was founded in 1887 in Berlin-Charlottenburg [3] and which later served in some ways as a pattern for the establishment of the National Physical Laboratory in England and the National Bureau of Standards in the USA [4,5]. Now all developed countries have one or several of such metrological centers to achieve traceability to national standards and compatibility of measurements in the whole country.

QUALITY ASSURANCE BY MEANS OF METROLOGY AND STANDARDIZATION

Quality is defined mainly as the totality of features and characteristics of a product or service bearing on its ability to satisfy a given need. Many of these features or characteristics are measurable quantities that result in a decision like "tolerable" or "not tolerable" (quality inspection by attributes). So metrology, which stands, in this paper, for measurement science and measurement technology, is an indispensable means to guarantee a sufficient product quality. The other necessary means is the development of product standards or standardized specifications with tolerance values of these characteristics.

Figure 2 indicates in a schematic way this fundamental role of metrology and standardization for quality assurance during production and for final quality control related to standardized mandatory regulations or to voluntary product standards. Both means have to ensure a sufficient and invariable product quality.

Metrology and Standardization: Fundamentals of Quality Assurance

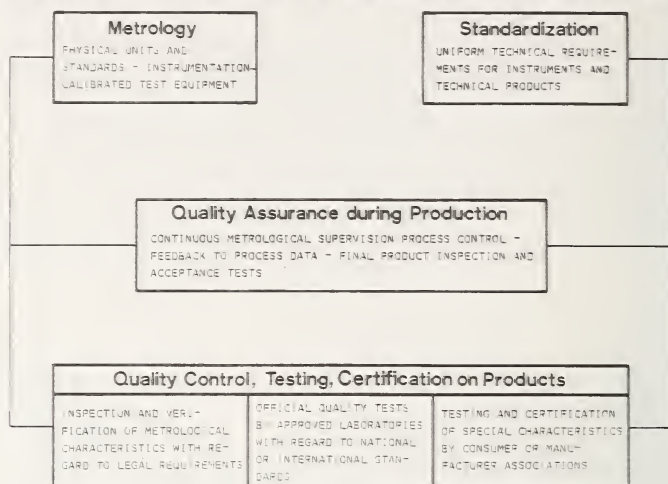


Figure 2. Fundamentals of quality assurance and quality control: Metrology and standardization.

In most countries, metrology is based on a more or less centralized national measurement assurance system, including scientific metrology centers, legal metrology institutes, and authorized domestic test laboratories. The national system of the USA, for example, is described in several publications [6,7], and may be well known to this audience.

As an example from European countries, figure 3 explains the structure of the measurement quality assurance system in West Germany [8]. The left side of this illustration shows the Federal part of this system with the "Physikalisch-Technische Bundesanstalt (PTB)," allied to the Federal Ministry of Commerce, as scientific center for basic metrology. PTB is also the supreme technical authority for traceability to national standards, for type testing and pattern approval, and for metrological specifications. The State part is governed by 11 competent

State ministries, each having a central legal metrology institution. These institutions direct and supervise the activities of some hundred State legal metrology offices and authorized test laboratories. Their testing activities cover a broad field of such measuring equipment and metrological comparisons, where public interest for accuracy and reliability is highly involved. That concerns, for example, trade and commerce, health and safety, traffic supervision and pollution control.

An important new part of this measurement system is the calibration laboratories of the "Deutscher Kalibrierdienst," accredited on a voluntary basis by PTB. Until now, about 60 laboratories from industry, scientific metrology institutes, or test institutions asked for such an accreditation, by which appropriate test equipment and traceability to PTB standards is ensured.

Structure of the National Measurement System of West - Germany

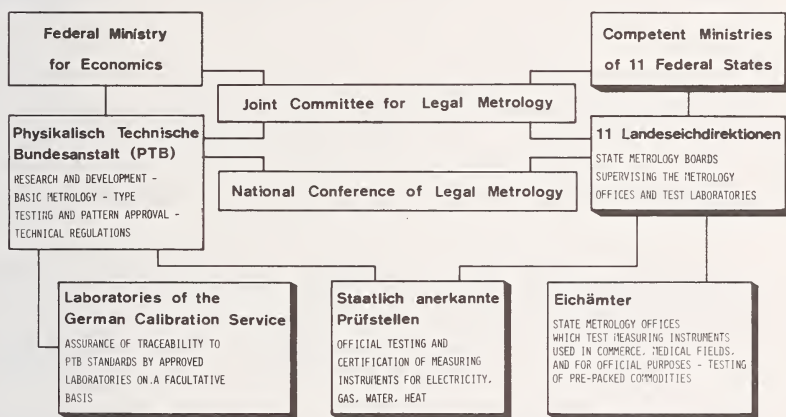


Figure 3. Structure of West Germany's measurement system assuring traceability to national physical standards.

The whole described measurement quality assurance system may have a staff of about 6000 people. PTB itself has about 1500 employees: physicists, engineers, technicians, skilled workers, and administrative staff.

An important means to meet the quality standards for measuring instruments for complex measuring devices is

type testing and pattern approval. This is executed in most European countries on a mandatory basis by national laboratories. For some kinds of instruments, such pattern approvals of a member country of EEC are valid in the whole community on the basis of harmonized technical regulations. There is, however, up till now, no common EEC directive prescribing which kinds of instruments have to be submitted to the mandatory rules of legal metrology. Accordingly, such a pattern approval may be in one country mandatory, in another country voluntary.

In any case, such type tests may ensure that the metrological characteristics such as accuracy, stability, or reliability can be preserved under the expected conditions of practical use. These conditions may be simulated during the type test by, for example, mechanical shocks, electromagnetic interference, or variation of temperature and humidity.

Figure 4 shows some types of measuring apparatus submitted to pattern approval in the field of legal or regulatory metrology. Besides some instruments from the classical field of weights and measures (weighing instruments, length measures, volumetric apparatus) one may find here, for example, sound level meters, radiometric speedometers, dosimeters for ionizing radiation, measuring apparatus for blood pressure, and carbon monoxide indicators. These instruments belong to fields like public health, radiation protection, and public safety, where accurate and reliable measurements and measuring instruments have at least the same importance as measures for commercial transactions.

In the requirements for regulatory metrology in some European countries, only such type tests and pattern approvals qualify the legal metrology offices to execute routine tests on individual instruments. Such individual tests, however, may be replaced by statistical supervision of measuring results or by round robin tests among test laboratories. In West Germany, for example, these methods are introduced for clinical laboratories, instruments measuring electrical energy, or electronic data processors connected with measuring apparatus [9,10].

Moreover, volumetric or gravimetric filling apparatus used in the field of prepacked commodities is not submitted to mandatory pattern approvals or individual tests. In this field, sampling inspection of the prepacked commodities is prescribed by detailed technical regulations and standardized test procedures. The mean values of all filled quantities must exceed the indicated nominal value. Only a limited number of packages may have a lower content than a prescribed negative value. By this

indirect means the filling companies are urged to use weighing apparatus or volumetric filling machines of a "reasonable quality" as shown in the simplified graph (fig. 5).



Figure 4. Kinds of measuring instruments submitted to mandatory type testing and pattern approval in several European countries.

COOPERATION BETWEEN INDUSTRIALIZED AND DEVELOPING COUNTRIES

It is now generally accepted that metrology and standardization are basic needs for developing countries also. Both are important parts of a necessary infrastructure for economic and technical development and for improvement of public health and safety.

There exist several activities to assist industrializing countries in the establishment of national metrological institutes, of standards organizations, and of test facilities for quality assurance. Other activities result in the training of technical staff or in the transfer of know how in seminars or workshops by experts in metrology and standardization from industrialized countries. This is done on a bilateral basis between two countries, but also by cooperating international organizations like UNESCO, UNIDO, OIML, IMEKO, ISO, and IEC.

Let me please restrict myself to some remarks about our national activities and experiences. Figure 6 indicates some focal points of PTB cooperation with industrializing countries especially in the fields of industrial and legal metrology, of physical standards and metrological standard specifications, and of calibrating facilities and instrumentation advice. The different toning in the graph indicates different stages of cooperation: training of staff and advice by experts (black), extended bilateral projects in preparation (dotted), and current bilateral projects (gray).

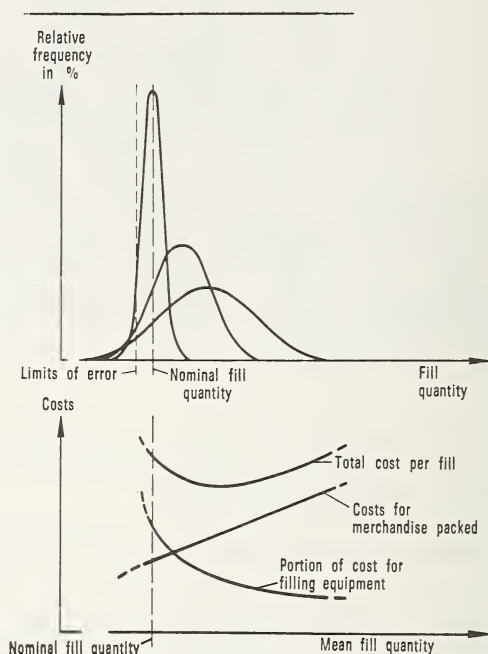


Figure 5. Optimizing the median of prepacked commodities by using volumetric or gravimetric filling machines of suitable accuracy and repeatability.

PTB prefers such projects when a partner-institute already exists in the respective developing country. This may be a governmental metrology center, a nongovernmental standards institution, or an independent test and calibration laboratory. If the discussions lead to some results about possible cooperation, and if the governments are interested in such a project, a bilateral agreement may be prepared describing all details of the project.

standards to ensure a sufficient and invariable product quality.

The request from a developing country is usually made for three reasons: 1) the desire to take over the experience of more industrialized countries on the quality level that has to be achieved to overcome technical trade barriers, 2) to assure by metrological tests the required standard quality for goods produced within the country, and 3) the ability to control, owing to national or international product standards, imported goods as to their measurable characteristics, specified by foreign manufacturers.

Sometimes industrializing countries think that the problem of product quality has to be solved primarily by governmental activities, e.g., by a system of rigid quality control by governmental laboratories. In accordance with our experience this will not work without assistance to the producers' own quality assurance activities and to their capability to produce within appropriate tolerances at a sufficient and uniform quality level.

When we advise, not only in the development of metrological services, but also in the establishment of technical product standards, we always recommend the use of international standards as far as possible. Very often, however, such standards have to be adapted to the abilities of the country's own manufacturers and to the economic situation in the country.

CONCLUSIONS

Some ideas presented in this paper may be summarized by the following remarks:

- o Metrology and standardization are fundamentals for quality assurance. The importance of these disciplines will increase in the eighties because of automated quality control in production and in test laboratories, integration of measuring instruments into complex information systems, and the rapid development of medical, biological, and agricultural techniques.
- o In developing countries, metrology and standardization are keys to sufficient product quality. These disciplines belong to a necessary infrastructure for technical and economic development, like

education, agriculture, and public health.

- o Numerous international activities exist to harmonize metrological standards and to avoid barriers in the exchange of products, energy, and technical know-how. A better coordination of these activities seems to be desirable. Regional standardization should accept, as far as possible, results achieved on a worldwide basis.
- o The statement that standardization is an "integrated discipline," as sometimes proclaimed by national or international standards organizations, is not acceptable for metrology. Such a statement does not consider the creative part of metrology. New developments of measurement science and measurement technology cannot be standardized in advance. To the contrary, they often have to overcome obsolete standard specifications. Metrology and standardization are mutually linked from several points of view; they are, however, individual and independent disciplines.
- o Metrology and standardization are very closely connected to attributes like objectivity, justice, accuracy, and reliability. Especially in metrology these characteristics are much more important than any political point of view. This may give us the hope that a narrow worldwide cooperation in assuring uniform standards and meaningful measurements will considerably contribute to a better international understanding in an advancing world.

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LIQUID HYDROCARBON MEASUREMENT IN THE DECADE OF THE
EIGHTIES: THE NEED FOR RESEARCH AND RESOURCEFULNESS

Presented by RICHARD P. TRASK,
President, Petroleum Equipment Institute



It is the purpose of this paper to present a perspective on liquid hydrocarbon measurement that may differ slightly from the perspective to which the Conference has addressed itself in recent years. I respectfully request that you look at the petroleum marketing equipment industry as a complete economic entity, just as we look at the petroleum industry as a complete industry from manufacture of its product to final dissemination in the marketplace.

You have heard from manufacturing members of the Petroleum Equipment Institute in recent years. What is often less obvious is that the manufactured products in the equipment industry often pass through the hands of a distributor who maintains local stocks of parts and equipment. That distributor may or may not actually install his product. If he does not install and service it himself, there is a complete network of service/installers that functions in every jurisdiction in the country, however small.

As an industry, we are extremely proud of the manufacturers who research, develop, and make available for sale, the finest liquid marketing equipment available in the world. Almost universally, they are proud of the firms that offer their goods in the marketplace and effect sound installations within the many codes that must be followed in various jurisdictions. The enforcement officials in this country impact on a day-to-day basis with this far reaching network of service and distribution personnel. Few pieces of equipment offered by the oil marketing equipment industry pass from manufacturer into use and through continual operation without the services of members of the Distributor and Affiliate Divisions of the Petroleum Equipment Institute.

My personal perspective is that of a second generation distributor of oil equipment in a major metropolitan area. I represent almost twenty manufacturers of products used in the sale of gasoline and other liquid hydrocarbons. I compete in the New England area with eighteen other firms who sell, service, and install the products of

almost every equipment manufacturer in the nation. A manufacturer cannot survive in the equipment market without local sources of parts, service, and expertise. A distributor cannot survive without viable innovative manufacturers. Service and installation contractors do not survive without each of the others and we cannot survive without them.

Every problem of liquid measurement that manifests itself in the marketplace impacts on the entire industry. PEI will soon reach a total membership of 800 firms. Of these, almost five hundred are distributors. Two hundred are manufacturers, and the balance are affiliate members with a business interest in oil equipment. Affiliate members service, install, test, and publish information critical to our industry. There are scores of manufacturers' representatives. This is a tremendous resource for weights and measures authorities. Most of you are familiar with us as an industry. Please call on us for any assistance. Please consider the needs of our entire industry as you implement standards. Ours is a long tradition of operating in close harmony with those who evaluate and enforce standards on the equipment that we bring to the market.

Liquid hydrocarbon measurement in the decade before us will likely change, but change will be relatively minor in the sense that "presence of product" is determined by a hydraulic device of some type. The informational science is the area that will become unrecognizable. We begin the decade in a period of confusion and change in petroleum marketing equipment, and it is important to sort out the root of our confusion and reorient ourselves to the actual physical problems in measurement as opposed to those being created by a unique coincidence created by the size of our unit of measurement, the value of our monetary unit, and the capacity of our computing devices.

Let us briefly look at each of these three parameters and see why our present predicament is unique and coincidental. First, if our unit of measurement were larger in volume, the pricing crisis would already have occurred. The U.S. gallon has no logical base other than its traditional acceptance. If it were smaller in volume, the pricing crisis would not have occurred, and we would either still procrastinate or make an orderly transition to a smaller unit. Introduction here in our discussion of the metric system would be counterproductive. The U.S. quart would be as logical physically. Only the introduction of a second limit renders the size of the unit important. That limit is the capacity of our monetary unit.

The U.S. dollar is at a unique spot on its value curve. Suddenly, it is no longer capable of procuring in excess of 1.0 multiple of a standard unit of common refined hydrocarbon. The arguments can be so abstruse as to question the very basis of money or as simple as supply, demand, and the political environment. If the dollar had a higher value in absolute terms, we would still have time to procrastinate or make an orderly change. If it had significantly less value, the pricing crisis would have passed, and a transition would have been made but perhaps at a more optimum time. Only when we interface the monetary unit with the volumetric unit, do any of the equipment deficiencies manifest themselves.

Obviously, the most common device that fulfills these criteria is the standard mechanical gasoline dispensing pump. There are, at present, six major manufacturers of such equipment in the United States. Their requirements for mechanical computers are supplied by one domestic manufacturer. All seven of these firms are members of the Petroleum Equipment Institute. The single most pronounced characteristic of the products of all seven firms is their reliability. Electronic calculation of selling prices might have been a natural technological advance of the decade of the eighties; that will never be known. Mechanical calculation is neither passé, nor, if it passes into history, will it be a result of an inherent problem in the device. For just short of a half-century, that one mechanical device produced accurate, reliable information. It was affordable, repairable, readable, and traditional. The new generation of mechanical devices first had the capability of pricing to \$1.99, and even now, pricing to \$2.99 is available in this type of device. Gearing is available which will permit a change to the metric mode with minimal effort. The problem within our industry is the transition time.

Industry sources report that there are approximately 1.3 million service station pumps and dispensers in use in the U.S. today. The same source indicates that, as recently as eighteen months ago, practically none of them were capable of either liter measurement or pricing over 99.9¢ per gallon. A survey of the major oil companies by API reports that 19 companies surveyed had 561 000 pumps in operation. Of this number, 144 000 or 25.7 percent have been converted to price in whole units in excess of \$1.00 per gallon. That is, they have been provided with Veeder Root 2002 computers, an electronic computer, or are electronic pumps. A total of 160 000 pumps are equipped with the capability of pricing by the liter and an additional 24 000 are now pricing by the liter. The

most significant figure is that 341 000 or 61 percent of the total surveyed remain to be converted.¹

It is logically concluded that the major oil companies are probably further along than the independent marketers. It is safe to assume that of the total population of gasoline pumps in the U.S. today, no more than 30 percent are now capable of pricing in whole units over \$1.00 per gallon or in the metric mode.

The responsibility of implementing the conversion lies with the petroleum industry. They have proceeded with dispatch and have let contracts and purchased equipment wherever available. The supply industry that services the petroleum industry has never been as taxed as it is at the present time. We have literally gone from crisis to crisis for the last ten years. The petroleum marketing equipment industry has been asked to respond in that time frame to the following:

- 1) Initial introduction of a third product to permit lead-free marketing.
- 2) Phase I vapor recovery.
- 3) Partial Phase II vapor recovery.
- 4) The introduction of gasohol.
- 5) Consumer use of diesel fuel on a large scale.
- 6) Transition from 49.9¢ to 99.9¢ pricing.
- 7) Large scale self-service marketing.
- 8) Fleet fuel accountability on an unprecedented scale.

Few industry figures probably retain a true grasp of the underlying industry which exists without artificially induced programs. Behind the major equipment manufacturers mentioned above, there is a network of distributors and maintenance/installers who physically provide the service that is performed on the 1.3 million pumps in the field. The number of qualified installers and mechanics is a finite quantity. This trade has traditionally worked in close concert with the weights and measures enforcement officials in every jurisdiction in the country. We need ask no further than our officials in the weights and measures areas to prove just how finite is the quantity of qualified pump and tank people in the industry. There must be a reasonable time framework in which those qualified individuals can perform traditional services as well as make a major mechanical change in every dispensing unit in the nation. January 1, 1982 does not represent the end of a reasonable time frame.

¹"Tulsa Letter", May 8, 1980, Tulsa, Oklahoma, The Petroleum Equipment Institute, p. 4.

The strength of the petroleum marketing equipment industry does not seem to lie in any quantum technical leap during our lifetimes. Rather, it is the technology that has not changed that proves ours to be a mature, sound economic structure. The three aspects of hydrocarbon measurement that concern each of us are hydraulics, information, and integrity. The hydraulics of petroleum measurement manifest themselves most often in the positive displacement meter by which the majority of transactions are measured. Pipeline activity seems to utilize turbine meters to an extent that will probably never be equaled in marketing operations. The basis of the positive displacement technology, which we see on a day-to-day basis, goes back to Ancient Greece when Archimedes determined that if he placed a rock of amorphous shape into a vessel full of liquid and measured the spillover of "product," he would then know the actual displacement of the rock. This most basic principle has not changed. We work in multiples of a known displacement.

Really, what we do is to measure the volume of a vessel, less the volume of a rotary element placed therein, and count the number of times that we replace the supply displaced by the rotation of the element. There are problems: we must make sure the vessel is tight; we must keep liquids and gases that we do not want to measure out of the vessel. We must make sure that the tolerances are as close as economically feasible to insure that little of the hydrocarbon slips past the element, and is therefore not measured, or measured and not delivered. Certainly, also, we must insure that the materials of which we construct vessels, seals, and elements are compatible with the liquid being transferred. We must make sure that the liquid does not destroy the meter and that the meter does not destroy the liquid.

Only the economic feasibility of the tolerances and the materials of construction appear likely to change in the hydraulics system. Petroleum has become, for reasons discussed previously, a semi-precious liquid. Economic feasibility changes as it behooves the owner of the liquid to assure that he loses not one drop. Materials of construction will change as thermoplastics and sealing compounds change, but this is likely less significant than the fact that increased use of products like gasohol will necessitate use of materials compatible with their unique properties. The motivation for change has its roots both economically in the desire to account for all product and equally in the economics of the life cycle of the measuring device.

Knowledge will increase in fluidics, lasers, and as yet unexplored properties of materials. But the decade

before us will not see the demise of the positive displacement meter for the simple reason that of all possible devices, it works, can be economically produced, and is possessed of a confidence level with consumer, user, and enforcer. The positive displacement meter is nothing more or less than a hydraulic motor. The motor generates a known quantity of rotary motion. It is what we do with that rotary motion that will significantly change in the decade ahead.

Our hydraulic motor, driven by the liquid to be dispensed, is a system of integrity. Traditionally, the meter drives a rotary register, which may or may not compute. It may look like an odometer, a series of rotary discs, or the tumbling wheels which are so common in the mechanical computer presenting today's problems. In the decades of the sixties and seventies, we began a subtle transition in bulk transfers which has always been performed in shipload quantities. We began to compensate for changes in the product volume for the temperature at time of measurement.

A restatement of temperature compensation is that we have begun to measure liquid in terms of the amount of work it would perform. The motivation for commercial temperature compensation was to assure a uniform pricing of a refined product which certainly was not volumetrically identical to the product shipped, but could be returned to that volume with a change in temperature back to the conditions under which the shipment was "packaged." The consumer justification for temperature compensation is that the consumer will begin to perceive his dollar as being spent for a unit of work rather than a unit of volume.

The deepest fiber of our consciousness will never permit most of us to think in other than volumetric terms for hydrocarbon measurement. Temperature compensation permits the product to be sold in the reality of the Btu or calorie. It is not inconceivable that heating fuels may someday soon be dispensed by the energy therein contained. This appears less likely for motor fuels. Even in the discussion of temperature compensated fuels, there will emerge the apparent logic of the metric forms of measuring energy as opposed to traditional U.S. measures of energy rather loosely based on the archaic British system. There is great logic to expressing liquid measurement of hydrocarbons in this manner. It uniformly dispenses product from day to day, buyer to buyer, and geographic locale to geographic locale. The only requirement is a total reorientation of the thought processes of some 200 million people.

Herein lies the problem with conversion to the metric system of measurement. Most of us, no matter how far we go with national metrification, will spend the rest of our lives thinking of oils, gasoline, and most other products in terms of the U.S. gallon and its subdivisions. My children are capable of conceptualizing liters. I probably am not. I can visualize a liter, but my subconscious is reassuring me that it is a big quart.

The logic of the system is not the motivating force in the movement to adopt the system, particularly for sale of gasoline. The motivation is that it attacks the first of the three parameters of the computational problem discussed earlier in this paper. If the liter were larger than the gallon, there would be no outcry for its adoption.

Nonetheless, it is extremely likely that we will be actively measuring the majority of our principal burnable hydrocarbons by the liter and its multiples by the middle of the decade. Any manufacturer or distributor who is not operating on this assumption is doing his customers and himself a tremendous disservice. Our monetary unit is unlikely to change. Our hydraulics are unlikely to change. Where then is the tremendous call for research and resourcefulness to have its basis?

The principal area is in the transmission and processing of data outboard of the traditional device that allows a numerical readout of the transfer of product. It is no secret that the oil marketing equipment industry has only scratched the surface of the adaptation of electronics to our equipment. The petroleum measurement specialist of the eighties will have as thorough a grasp of data processing systems as he will of hydraulics. Bulk facilities will be tied in together for purposes of allocations, transmission of credit data, and control of inventories. Those responsible for the integrity of the system will have to be familiar with devices that are unknown today. Decisions will have to be made on the basis of parameters that today appear strictly experimental.

The converse of the ultra-technology may be appearance in the marketplace of refiners and bulk facilities that are far smaller and different than anything that is now an integral part of the system. The introduction of gasohol on a commercial scale has seen the establishment of many small refiners or distillers of alcohols who often use equipment and innovations that are unfamiliar to those of us who have dealt in the more traditional markets. To what extent will we have to be satisfied with the integrity of measurement systems of feedstocks

for distillation? How can we insure the purity of the distilled product that is being blended with traditional hydrocarbons? Who can predict what further products will be rendered economically feasible by the increased world price of petroleum?

Synthetic fuels are no longer an economic unreality. The decade ahead of us will see the introduction of fuels that will function in an internal combustion engine but of which we know little except that they will be liquid and must be measured and taxed. Is it unreasonable that there may be ramifications of the introduction of electrically operated vehicles, which may necessitate the sealing of recharging equipment?

American industry will respond to the challenge of measuring the energy sources that will emerge in the next decade. The full-unit sale of over \$1.00 per gallon fuel was simultaneously achieved in small scale shops all over the country by mechanics who knew how to alter the gearing of traditional devices to achieve a temporary expedient. It is commonly agreed that most of these "kits" were temporary expedients, but the speed with which they appeared and the soundness of the engineering were indeed encouraging. The speed with which manufacturers of equipment were able to increase their production is amazing in light of the magnitude of the problem. It would be a far safer gamble to assume that the measurement industry will respond than to assume that we will face an insoluble measurement problem just by the uncertainty of the product that will dominate.

In preparing my comments, I surveyed every member of the Petroleum Equipment Institute whose principal product dealt with the measurement of products for resale. Each and every company surveyed responded. The complexion and tone of the comments was a confident statement of concern. There was no mood of pessimism for the decade ahead. Technical concerns were significant by their absence. The only concern was for time. The observations were sincere. They recognized some trends and contained far more encouraging information than could have been expected.

None of those surveyed appeared to resent or dread the implementation of the metric system measurement. Indeed, most have been measuring metrically in other political jurisdictions for many years. Most report that restricted availability of hydrocarbons has seen an increase in their sales of measuring devices. One of these companies reported significant activity by consumers metering incoming product to verify the information from the traditional truck meters. Another discussed the

value of his product as being only as good as the field people who serviced it and the sealer who evaluated it. The most common theme was that the companies were in the business of measuring "value."

The relationship between the members of the equipment industry and the sealer in each jurisdiction has almost always been one of great mutual respect. Within the framework of the public good, sealers have almost always been sympathetic to the needs of our industry, and certainly the industry's respect for a conscientious, strict and fair sealer has changed little in the more than sixty years since liquid measurement has become a mature science. Strict enforcement of standards is certainly not a new concept. Bartenders in Ancient Babylon who were convicted of pouring a "short drink" were condemned to death by drowning. Today's standards are perhaps a bit more reasonable to work with.

The most interesting standard to come from the introduction of the metric system will be the actual conversion that is determined to be significant. A price per liter should be stated as equivalent to a price per gallon stated to three decimal places. On what scale do subdivisions beyond this become significant? Is it significant that electronic gasoline pumps be capable of measuring the gallon or liter into hundredths subdivisions? Each new generation of service station pump computer will be plagued by these questions. Are any of these considerations significant in the light of the integrity of the remainder of the hydraulic system?

In the standard dispensing device we must examine also such components as the hose, nozzle, pumping unit, and air eliminator to see if they permit inaccuracies that could be more significant than those in the actual displacement of the meter. Certainly, too soft a hose can cause more significant "computer creep" than an inaccuracy in the computing mode of the electronic computer at the third digit after the decimal. The location of the check valve in a nozzle is certainly of more significance than accuracy to three places.

We will continue to have new problems while we discard some of the old. A mechanical computer needed service when it read differently on both sides. Electronic computers will probably not have that problem, but certainly a burnt out numitron is as important to the aware consumer. I am frightened by the ease with which we drift into the "lingo" of a new era. A numitron is an incandescent bulb that illustrates in a readable manner the information calculated within. The generic terms that we use to

describe the components of new systems will be a potential problem. The sooner we separate marketing semantics from a workable generic description, the easier it will be to sort future problems out into workable standards.

There are jurisdictions that concern themselves with the readability of the incandescents used in dispensing devices. Others have a much broader interpretation of what constitutes the actual act of visibly imparting transaction information to the consumer. Informational considerations that are workable on a commercial level may not always be sufficiently understandable for consumer use. In short, there is a strong case for intermediate generations of hydrocarbon dispensing devices that have a form and shape for no other reason than that they "look like a gasoline pump."

A P.E.I. member in Canada described that country's conversion to metric dispensing of gasoline as the biggest "non-event" that he had ever seen. Why would such a conversion be so different in this country? The reasons are numerous. First, there is the perception that someone is profiting from the change by elevating prices. Second, there is the fact that the unit price of our hydrocarbon has already exceeded the price of 1.0 unit of volume per traditional measure. Third, a lot of our dispensing equipment no longer looks traditional. Finally, our population actually believes that since we have shied away from the metric system for so long, there is something complicated and confusing about it.

It was mentioned earlier that in terms of the actual computational device, the same thing would be accomplished by a change in calculation by the quart as would be accomplished by liter measurement. There is no need to examine the numerous advantages of changing to the metric system as a basically more logical system. For the equipment industry, however, much more must be learned than the gallon/liter conversion if the system is adopted in its entirety.

While the average individual has little difficulty with conceptualizing solid and liquid measurement, other units present more problems. The thought processes that must go into structural strengths to handle a given number of kilopascals of pressure and pipe velocities in meters per second are more difficult. More complex calculations utilizing all aspects of the system derive their advantage in the ease of physical calculation. The part that is lost is the ability of the experienced equipment man to gauge by experience when gauges and flows are functioning properly. Such functions of

"Kentucky Windage" as 50 gallons per minute requiring a 2-inch pump and meter are no longer obvious choices. Such universal adoption of the metric system is further down the line than the adoption of the liter as the standard unit of volume.

The advantages in international trade need no further detail. Domestic manufacturers would certainly benefit from the uniformity after initial investment considerations. The problem in the remainder of the system from well to nozzle is more complex. Oil company estimates if the entire system were legislatively mandated are staggering. Metrication is the solution to the retail and pricing problems, but there are disadvantages for all if there is not further time for implementation and investigation of the other facets of the various hydrocarbon industries.

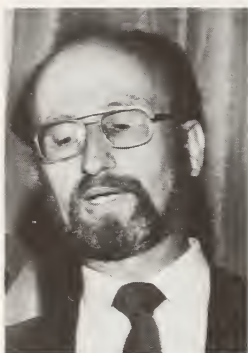
We are on the horns of a dilemma that was caused by no single factor. We are on the threshold of numerous changes affecting the very fiber and framework of the liquid energy industries. One is reminded of the snake, which ingests its victim; its body distends almost unbelievably during the early stages of digestion. My industry has the same digestive problem. There is a program at hand that is greater in magnitude than the industry can solve in the time allowed. We have too much pride to do the job incorrectly. The membership of the Petroleum Equipment Industry has a long tradition of innovation, resourcefulness, and service. Before we can re-embark on the mission of providing the best in new products and methods of processing information, we must have additional time necessary to implement the changes that the idiosyncracies of time, market, political climate, and monetary values have artificially perpetrated on a mature industry.

Thanks are offered to the following members of the Petroleum Equipment Institute who generously offered comments in response to my inquiries.

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Northeastern Petroleum Service
and Supply, Inc.
Southwest Pump Company

TYPE APPROVAL - A TOOL FOR MEASUREMENT ASSURANCE
IN LEGAL METROLOGY

Presented by DR. E. SEILER,
Physikalisch-Technische Bundesanstalt,
Federal Republic of Germany



First of all, I would like to thank the organizers of the conference for giving me an opportunity to attend the conference and to speak to you. The general topic of this year's conference, "Expectations for the 80s" is also of interest for those concerned with legal metrology in other countries because international cooperation is well established and becomes more and more important. This collaboration requires a minimum knowledge of the legal metrology system of other countries. One way to reach this goal is to attend conferences like this one. May I take the opportunity here to thank those of you who informed me about your system during my stay in your country.

Before I start, I would like to mention that I use technical terms as defined in the Vocabulary of Legal Metrology [1]¹. According to this vocabulary, pattern approval is "a decision taken by a competent state authority, generally the national service of legal metrology, recognizing that the pattern of a measuring instrument conforms to the mandatory requirements."

In the Federal Republic of Germany the Physikalisch-Technische Bundesanstalt (PTB) is responsible for pattern evaluation and pattern approval of measuring instruments while the verification is actually carried out by the competent State authorities (Eichämter der Bundesländer). In my report, I will give a short outlook on what we will have to expect for the 80s as far as measuring instruments are concerned. Then, let me mention a few problems that will come with this development and describe which role pattern approval may play in order to assure correct measurements.

To deal with the expectations of the 80s requires a prognosis of the development of new types of measuring

¹Figures in brackets indicate the literature references at the end of this paper.

instruments. As a first approach, assume that today's technologies will also be used in the future to an increasing extent for the design of new measuring instruments.

As in other technical fields, the strongest impulses can be expected from electronics and data processing techniques. The following example will demonstrate what is realizable today by semiconductor technology.

You all know weighing machines, the functions of which go far beyond mere determination of masses. Let me only mention here automatic zero correction, tare device with storage, automatic range switching, price computer with totalizing facility, printed output, data storage, and remote control of data storage.

If this weighing machine had, for instance, been installed in a supermarket, it could have been connected to a central computer together with many others. With the computer, unit prices as stored in memories of the remote weighing machines could be changed for all of them at the same time. Moreover, these data could be read by the computer and be made available for central evaluation at any time.

Progress from simple measuring instruments to complex data acquisition and processing systems is not restricted to weighing machines. For this reason, instead of simple measuring instruments, measuring systems with the following characteristics will be used to an increasing extent in the eighties: 1) electronic equipment replacing mechanical parts, 2) digital signal processing and display, 3) programmable control devices, 4) intelligent systems, 5) remote control, and 6) sophisticated peripheral equipment.

Such a development entails an increase of electronic components in the measuring system. Due to the programmability of certain modules it will be possible to adapt one basic measuring system to many different applications.

New generations of measuring devices will be put into the market at shorter and shorter time intervals. This certainly causes new problems in the evaluation of the pattern of new instruments such as reliability and long-term stability of new components, electromagnetic interference and compatibility, testing of software, and interface problems with peripheral equipment.

In the following, I will restrict myself to the problems of electromagnetic interference and programmability of measuring instruments and outline some ideas of our approach to solving these problems.

As far as EMI is concerned, you will certainly remember the lectures given two years ago at the U.S. National Conference dealing with "Electromagnetic Interference - A Problem of Growing Concern" [2], and "A Practical Approach to the Electromagnetic Interference/Radio Interference Problem in the Field" [3].

Let me explain by an example from our experience why even today measuring instruments must be tested with regard to their immunity from electromagnetic interference.

Press reports in our country had informed the public that radar equipment used for speed checks of road traffic may be influenced by electromagnetic interference from portable transmitters (such as CBs, etc.). As a consequence, traffic offenders caught by the police protested in Court against their convictions. The judges were puzzled by these press reports and demanded that the police furnish proof that measurements had not been falsified by interference. Generally, the police were unable to give that kind of proof, and therefore, many traffic offenders had to be declared not guilty. In order to eliminate this uncertainty in furnishing substantiated proof, the pattern approval of radar equipment by PTB will now comprise tests concerning the susceptibility to interference.

What happened to the traffic radar equipment may also happen to other types of instruments equipped with electronic devices. This was the reason why we tested scales of different patterns under the influence of electromagnetic radiation [4].

The scale to be tested was placed into an electromagnetically shielded chamber. It bore a constant load. Frequency and amplitude of the electromagnetic waves emitted by an antenna were swept and adjusted by frequency generators and amplifiers. The field strength at the location of the scale was measured by means of two measuring antennas. It turned out that all four scales tested were influenced by the electromagnetic field.

The following effects were observed at certain frequencies and at sufficiently high amplitudes of the field strength: 1) The indication of the scale did not come to a standstill or a total blackout of the indication was observed, 2) the printing device was activated so that tickets were printed continuously, and 3) the mass indication increased with increasing field strength.

This behavior of the scale under the influence of electromagnetic radiation is very critical since a user of the scale may not notice any reason for false indication, which will last as long as the electromagnetic radiation is present.

For the scale under test nothing happened up to about 5 V/m. But with increasing strength of the field at a frequency of about 44.5 MHz the indication of the scale changed significantly and showed a larger mass. The same effect was observed at the first and second harmonics with respect to 44.5 MHz, i.e., 89 MHz and 178 MHz.

To avoid the risk of false measurements because of electromagnetic fields, we will further test the susceptibility of instruments to electromagnetic radiation. Requirements given below are taken from a European-draft-directive [5] for this purpose. These tests were carried out using the following values.

Specifications of External Disturbances

Electromagnetic radiation

<u>Field strength</u>	<u>Frequency range</u>
10 V/m	100 kHz - 5000 MHz
1 V/m	>500 MHz - 1 GHz

Magnetic field

60 A/m; 50 Hz

Electrostatic discharge

6 kV with energy of 2 mJ on earthed chassis

Because it is difficult to imagine what 10 V/m may be, figure 1 shows the distribution of the field strength near a broadcasting station. As can be seen, field strengths of some V/m occur at not too far a distance from the station.

You all know what happens if you walk on a carpet made out of synthetic materials and then touch a conductive part: the charge accumulated on your body will discharge. This may influence or even destroy electronic devices. This is one reason why we ask for this discharge test.

A magnetic field is always present when an electrical current is flowing. The magnetic field mentioned here will be produced by a current of 10 A at a distance of about 2.5 cm from the wire. The figures given here will have to be reexamined as soon as more comprehensive experience has been gained.

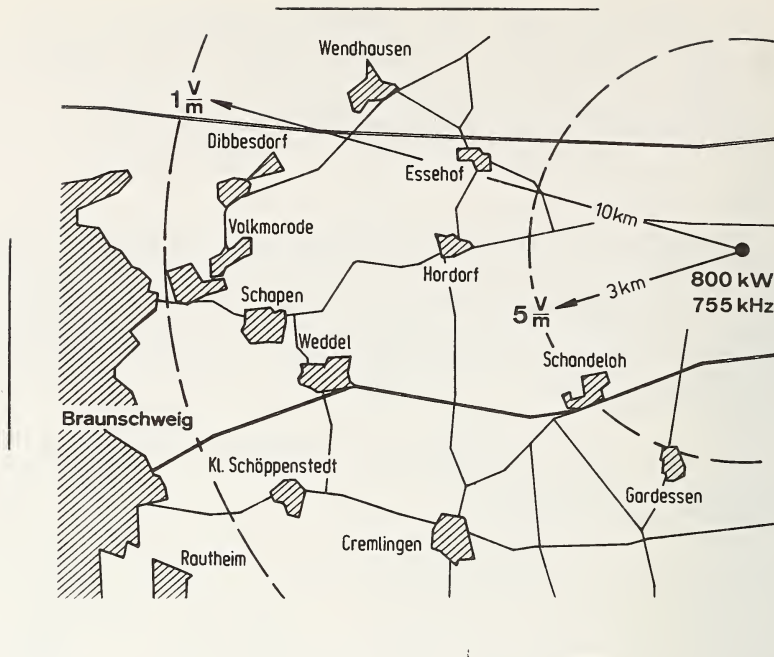


Figure 1. Electrical field strength in the vicinity of a broadcasting station emitting 800 kW at 755 kHz.

As the tests require a large amount of test equipment and a comprehensive know-how of the personnel carrying out the tests, this should be done not later than at the time of pattern approval. If constructional changes of the measuring instrument were required, then the manufacturer would still have the opportunity of making these changes before starting production.

In addition to the electromagnetic radiation, disturbances which affect the measuring instruments via power lines must also be considered. The following table summarizes requirements to which future tests will be carried out within the framework of EEC pattern approval. Various interferences superposed on the mains that are simulated by special test generators, are considered typical for disturbances that occur in power supply lines.

By doing these tests during pattern evaluation of instruments we make sure only instruments which are sufficiently immune against electromagnetic disturbances will be used for legal metrology purposes. These tests are as necessary as temperature and humidity tests, and they will be of increasing importance in the future because the electromagnetic environment will become worse

due to the increasing use of electronic devices and equipment, which again will produce electromagnetic disturbances.

Mains-Borne Disturbances

Amplitude	Risetime	Half-amplitude duration	Repetition rate
500 V	2 ns	100 ns	10 Hz
1500 V	25 ns	1 μ s	10 Hz
300 V			10 Hz
Burst of pulses lasting for about 1 ms of about 1 MHz			
5 % of the nominal value	sine wave superimposed on the mains		30 kHz - 150 kHz
1 V			150 kHz - 400 MHz

Now I come to the problem of programmability. Programming certain electronic components, instead of a permanent wiring, which then control the desired measurement procedure, is state-of-the-art and will apply more and more. Apart from the process control, mathematical operations can be carried out in order to correct, for example, non-linearities in the transfer function of the pick-up, to modify a measured value in a desired way, or to calculate a price of a measured quantity.

Thus, verification authorities will be confronted with the new task of checking software. Does this mean for the future that we have to recruit computer specialists as verification officers?

I do not believe that would be realistic, but I am convinced that we will soon cooperate very closely with such specialists during pattern approval of programmable instruments. What must be done and what can be done during pattern approval?

As the programs are, in general, established in a very special computer language they are, even for rather simple operations, very long, complex, and difficult to check, even for experts. Very often the test will be an indirect one. First, it has to be determined from the underlying flow charts, mathematical formulae, and algorithms, whether fundamental errors exist. Second, it has to be checked out by independent numerical samples that the program is correct and yields the expected results.

In addition to testing the software, a check must be made as to what measures were taken to prevent unintentional and false operation and intentional, fraudulent manipulation. Either must not happen without notice to the user or lead to false results.

Last, but not least, an essential part of the pattern evaluation should result in establishing a test procedure which has to be carried out during verification to make sure the approved program is really incorporated, is being used, and is running perfectly. All this demands comprehensive know-how regarding the structure of micro- and minicomputers and their programming.

For the purposes of verification, a detailed repeat test of the software of each individual series-produced instrument is, however, unnecessary if it can be guaranteed that approved programs have been used in the series-produced instruments. It is, therefore, expedient and useful for the verification officer that test procedures be fixed at the pattern approval which are applied for the verification of instruments manufactured in series. These instruments can then be checked efficiently even by officers who are not software experts.

Although the technical world becomes more and more complex, new technologies can also be applied to facilitate work and to provide means to assure correct measurements. Let me give an example to illustrate what I have in mind.

If it is necessary to add two measured values to get the required result, and if the calculation is done by a microcomputer, the function of the microcomputer can be tested by a self-checking procedure in the following way:

After certain time intervals preset by the internal clock of the microprocessor a subroutine is executed automatically which adds two stored quantities, $A + B$.

If	$A = 1\ 001$ and	(binary number system)
	$B = 0\ 111,$	
the sum C must yield	$C = 10\ 000.$	

The computed result is compared with the content of a memory which contains the correct result. If no equivalence can be established, an error flag must be set. This can be used for stopping the computer and for drawing the user's attention to the fault by an optical or acoustical signal.

By means of this simple test program, important functional devices, such as Central Processor Unit (CPU), Arithmetic and Logical Unit (ALU), Accumulator (ACC), Read Only Memory (ROM), and essential functions such as the carry-over of values from memory into the accumulator, and the addition, as well as the transmission, of the carry-bits can be checked.

Such test programs require additional programming efforts and storage capacity; however, they represent very efficient software test tools for complex measuring equipment. By including appropriate reference sources into the measuring device, these tests can be extended easily such that automatic self-calibration of the measuring instrument becomes practicable.

The trend of technical progress is, indeed, such that it is easier for the manufacturers of measuring instruments to comply with an early requirement of the PTB: electronic devices of measuring instruments must function correctly or any functional error must be recognizable.

In the past, this requirement could only be met by additional hardware involving considerable extra cost. As a result of the semiconductor technology, checking circuits or test programs can be integrated in measuring instruments, without considerable cost and in such a way that failures are recognized and incorrect measurements suppressed to a large extent. The efficiency of checking devices, however, has to be proved during pattern approval. Therefore, we consider the pattern approval tests one of the most important prerequisites for ensuring correct measurements.

There is another reason why I believe that pattern approval will become more important in the future to assure correct measurements. The development of new instruments speeds up so fast that it is a big problem for verification officers to stay up-to-date. On the other hand, by carrying out tests that are required for pattern approval, extensive information about the design, performance, and susceptibility of the instruments is gained. This information is essential for testing the instruments during verification and has to be transferred to the authorities responsible for verification. For this reason the documents that the PTB makes out, for example, on pattern approvals, comprise concrete instructions which are essential for carrying out the verification. It is thus ensured that the verification officers are able to carry out their task in an effective way and

that all measuring instruments are tested and verified independently of where they are installed and according to the same procedure.

Ladies and gentlemen, I have given you some rough ideas about pattern approval as a tool for measurement assurance. I hope this tool will also be sharp enough to shape the future of legal metrology in the eighties.

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RADIATION MEASUREMENT--A CHALLENGE THAT CALLS FOR
COOPERATIVE FEDERAL AND STATE ACTION

Presented by MARSHALL W. PARROTT, Chairman,
Conference of Radiation Control Program Directors, and
Manager, Radiation Control Section, State Health Division,
State of Oregon



The States have responsibility for the protection of public health along with police powers for the protection of the public. One of the public health responsibilities is protection against exposure to unnecessary radiation.

Radiation is no different from any other imperceptible pollutant. The general public is not aware of what radiation is or what it does. Radiation in the minds of each of you strikes a different note. Just what is radiation? It is not simple. Broadly speaking, radiation may be separated into two components, ionizing and non-ionizing.

Ionizing radiation is basically any radiation with sufficient energy to eject an electron from the atom, leaving the remainder as a positively charged particle. This results in the production of an ion pair, the atom and an electron. Non-ionizing radiation, on the other hand, generally does not have sufficient energy to eject the electron; therefore, transmits its energy by exciting, vibrating, or oscillating molecules. The electromagnetic spectrum is the entire range of radiation as we know it today. Starting at the top of that spectrum, the wavelengths are very short, but have extremely high energies. Progressing down the spectrum to the very long wavelengths, the energies become very, very small.

The upper end of the energy spectrum is ionizing radiation. This radiation includes x-rays, and cosmic and gamma rays. At the lower end of the energy spectrum is the non-ionizing radiation. This consists of visible light, infrared, microwaves, radar, television, shortwave radio, and electric power. The very, very long wavelengths of smallest energy are being investigated as modes of transmission of radio signals. The length of a single wave at this long wavelength is approximately one-half the diameter of the Earth.

The questionable radiations, of course, fall near the middle where the energies may, or may not, be high enough to eject an electron from the atom. Some ultraviolet light and some x-rays actually span those areas that may be called ionizing or non-ionizing. Visible light takes up but a small fraction of an exceedingly small place in the electromagnetic spectrum where both ionizing and non-ionizing radiation can be produced.

Some of the occupations subject to exposures that may occur from non-ionizing radiation include workers using RF sealers, welders, movie projectionists, ski instructors, wood curers, chemists, glassblowers, plastic heat sealer workers, rubber product workers, grocery checkstand clerks, etc.

The amount of damage caused by non-ionizing radiation has yet to be established across the non-ionizing portion of the electromagnetic spectrum. Ultraviolet light is known to produce certain forms of skin cancer as well as serious problems like snow blindness. Visible light, in the form of lasers, has been known to cause eye damage and skin burns. From there on, to infrared through microwaves, there are certain kinds of cataracts caused by microwaves if they are high enough in energy and long enough in duration. It is actually possible to determine by the location of a cataract within the eye whether that cataract was caused by non-ionizing or ionizing radiation. Whether some biological damage is caused by your CB radio or your neighborhood television station is still an unknown entity.

Radiation, obviously, is a complex and sophisticated topic, both technically and institutionally. A large number of groups, such as the American College of Radiology, the American Association of Physicists in Medicine, The American National Standards Institute, the Health Physics Society, the Radiation Research Society, the Conference of Radiation Control Program Directors, and many others are involved in radiation and have spent much of their time investigating the effects of ionizing radiation and methods of protection against those effects.

There are a large number of different instruments used for ionizing radiation measurements but the ability of those instruments to accurately define what is being measured is frequently in doubt. The presence of an alpha particle, a beta particle, a gamma ray, a neutron, or an x-ray may confuse the instrument as well as the operator. Even more confusing is the fact that the instruments frequently are sensitive to temperature, pressure, and humidity and respond to outside electromagnetic interference such as radio transmissions. The

simple task of calibrating a single instrument is a time-consuming and expensive process.

The Conference of Radiation Control Program Directors is attempting to work to solve many of the real problems and develop criteria for national standards on radiation measurements. The public sensitivity and interest run very high, creating an ever growing load upon each of the individual State programs. Three Mile Island used thousands of man hours of State radiation control personnel time in States that were unaffected directly by the event. That is not to say that Pennsylvania was particularly affected by the event except by being inundated by large numbers of Federal personnel.

There are an exceptionally large number of Federal agencies involved in radiation. Table 1 lists, I believe, all of the Federal agencies known to have radiation regulations, which frequently overlap, cause confusion, and lack coordination.

Radiation regulations are issued at many levels in Federal, State, and city government. The Conference of Radiation Control Program Directors has, in part, been organized to elicit conversation and understanding between Federal agencies, for self-preservation if nothing else. This circumstance is unlike Weights and Measures where only a few Federal agencies peripherally have an input. I have been told that the Food and Drug Administration has requirements on weight and volume in packaging and the U.S. Department of Agriculture on grain weight machines. Otherwise, the States have complete responsibility for maintaining and operating a national weights and measures system which is traceable directly to the National Bureau of Standards. This arrangement, as I understand it, is different from other countries of the world where the national governments assume total authority and responsibility for weights and measures [1]¹.

¹Figures in brackets indicate the literature references at the end of this paper.

Table 1. Federal agencies having radiation regulations.

Nuclear Regulatory Commission (NRC)
Department of Energy (DOE)
Department of Defense (Army, Navy, Air Force)
Environmental Protection Agency (EPA)
Veterans Administration (VA)
Department of Commerce - National Bureau of Standards (NBS) -
National Communication & Information Administration,
formerly Office of Telecommunications Policy
Department of Health, Education and Welfare - Health and
Human Services, National Institute for Occupational
Safety and Health (NIOSH)
Food and Drug Administration (Bureau of Radiological Health -
BRH)
Department of Interior (Mine Safety and Health)
Department of Transportation (Federal Aviation Administration,
Federal Railroad Administration, Bureau of Materials
Transport, U.S. Coast Guard)
Interstate Commerce Commission
National Transportation and Safety Board
Department of Labor-Occupational Safety and Health Admini-
stration
(OSHA)
National Aeronautics and Space Administration (NASA)
U.S. Postal Service
Consumer Products Safety Commission
Department of Agriculture
National Science Foundation
Executive Office of the President (Office of Science and
Technology Policy, Radiation Policy Council)

The technical range of radiation types, energies, and intensities presents a difficult problem of adequate public health coverage of all of these radiation sources [2]. Judging from the large number of sources, it is obvious that it is hard to pay attention to all of them adequately with limited resources. Furthermore, it is a dynamic field that is growing at both ends. While the people employed in radiation medicine are worried about higher energies for radiation therapy, the public health people are concerned as much about lower concentrations and intensities that impact on the environment. The scientific opinions in this latter area are very different although admittedly the resultant injuries may well be very few. The discussions are heated, thus newsworthy. Historically, State programs begin by examining x-ray sources, which produce over ninety percent of the man-made radiation by which people are affected in the United States. Table 2 refers to these x-ray machines as well as other non-Atomic Energy Act sources.

Table 2. Elements for a minimum State radiological health program for non-atomic energy act sources [3].

- I. X-ray Sources
 - A. Machine Registration/Licensing
 - B. Standards
 - C. Compliance - Machine Inspection
 - Facility Inspection
 - D. Enforcement
 - E. Constant Alertness to New Sources

- II. Non-Ionizing Sources
 - A. Registration/Licensing
 - B. Standards
 - C. Compliance - Machine Inspection
 - D. Enforcement
 - E. Constant Alertness to New Sources

- III. Natural Sources (Manufacture, Byproducts, Tailings, Phosphates, Radium, etc.)
 - A. Registration/Licensing of Radioactive Material
 - B. Radioactive Material and Environmental Standard
 - C. Compliance - Environmental Monitoring
 - Radioactive Waste Control
 (Effluents, etc.)
 - D. Enforcement
 - E. Constant Alertness to New Sources

- IV. Cyclotron-Produced Radioactive Materials
 - A. Licensing Users and Equipment
 - B. Standards
 - C. Compliance for Production and Users
 - D. Enforcement

- V. Other
 - A. Public Information and Technical Training
 - B. Program Effectiveness
 - C. Emergency Response (Fixed Facility and Transportation)
 - Planning
 - Training
 - Response to Incidents
 - D. Legislation - Writing and Testifying
 - E. Budget
 - F. Personnel
 - G. Update and Publish Regulations

The scope of the program is enormous. Although the Atomic Energy Act sources emit only a small fraction of the total radiation to which people are exposed, the program to control these sources takes up roughly fifty percent of the money spent in those States known as Agreement States (those that have signed agreement with the Nuclear Regulatory Commission to control all atomic radiation produced by the fission reaction except the reactors themselves and high level waste). Out of the approximately 20 000 licensees for agreement material, the 26 Agreement States now have responsibility for approximately 12 000 of those while the NRC covers slightly more than 8000. NRC licenses have not increased in number since 1970 due to the States absorbing more and more of the workload.

Compared to about 400 000 x-ray machines licensed by the various States, it is obvious the Atomic Energy Act sources are but a small part of the total radiation picture. Others include, as mentioned before, non-ionizing sources, naturally occurring radioactive materials in the form of uranium daughter products, byproducts of phosphate mining, and radium. Then, there are cyclotron-produced radioactive materials, which are also not covered under the Atomic Energy Act. Obviously, you in Weights and Measures would understand, as a group representing States, the necessity for other mundane program planning efforts like public information, technical training, legislation writing and testifying, budget, personnel, and updates in publishing regulations.

As you can see from the foregoing, there are a large number of responsibilities that have fallen upon the State radiation protection people exclusive of agreements programs. Yet, these responsibilities can be better met if a total radiation program is developed by a State, including non-agreement sources, agreement sources, and an environmental surveillance program.

The major State organization, which is accomplishing a great deal at this time at national levels, is the Conference of Radiation Control Program Directors mentioned earlier. The Conference is made up of all radiation control program directors in the United States, territories, and some major counties and cities. There are technically about 60 program directors. This group evaluates and writes the Suggested State Regulations for the Control of Radiation in cooperation with Federal agencies and has established several standing committees that deal with a number of subjects. Radiation measurements, personnel dosimetry, naturally occurring radioactive materials, emergency response, laser light shows, and

several others are on-going projects. Members of the Conference have spent a great deal of time testifying before Congressional committees, and as a unit, have been very responsive in assisting Federal agencies in their regulatory processes.

The States have become very concerned in the last several years over their ability to defend their radiation measurements in a court of law. We feel that effective, equitable enforcement of regulations requires measurements that are reliable, uniform, and sufficiently accurate.

What are the present needs of the States to meet such an approach to enforcement [4,5]?

- 1) The States need an independent evaluation of available instrumentation to determine the relative merits for a variety of uses and designs for instruments if none of those currently available meets all of the needs.
- 2) National calibration facilities are needed for all types of radiation sources and instruments and the provision of transfer standards and quality assurance checks.
- 3) Assistance is needed in equipping an inexpensive in-house quick check facility to determine reliability of in-use equipment.
- 4) Standardized procedures for all types of radiation measurements are necessary.
- 5) An annual peer review of all facets of the State's radiation control program, such as those currently done by the NRC on the Agreement States program, should help upgrade each of these programs.
- 6) Totally funded continuing education, like that provided by NRC to Agreement State personnel, would aid the new employee and sharpen the experienced employee (formerly funded by the Public Health Service).
- 7) More direct National Bureau of Standards assistance to the States in the areas of physical standards and measurements for radioactive materials and ionizing radiation are important.

- 8) More standard reference sources, especially in the environmental levels of radiation, need to be sent directly to the States at little or no cost.
- 9) The National Bureau of Standards should review and approve all Federal guidelines, standards, and regulations that require radiation measurements prior to the promulgation of those standards, and guidelines and regulations to assure that such radiation measurements are both technically feasible and practically attainable by States doing the measurements.
- 10) The National Bureau of Standards, in cooperation with the Environmental Protection Agency, should be designated as the Federal agency responsible for coordinating efforts among the Federal and State agencies to immediately develop a uniform data reporting system so that the present environmental data, which are being generated throughout the country, can be utilized and evaluated in terms of possible population exposures.

What does the future hold? Regional secondary-standard laboratories are now being developed in the States of Illinois and South Carolina. Ideally, more secondary-standard laboratories can be established regionally to make them readily accessible to the State radiation regulatory personnel for not only the calibration of instruments traceable to the National Bureau of Standards but the additional benefit of training in instrument response, capability, and use. The "States" regional calibration laboratories must be independent of those utilized by "licensees" because of the potential conflict of interest of having a State operated laboratory calibrating their own licensees' instruments. This, by inference, makes those laboratories responsible for the measurements made with those instruments. It would be most embarrassing in a court of law if the regulator and the regulatee were arguing over a measurement when the calibration had been done by the same laboratory. Federal and private industry calibration facilities are in several instances already available. Federal intermediate radiation calibration laboratories, such as Brookhaven and Argonne, are in existence. Good industrial calibration facilities are still lacking in availability except for the American Association of Physicists in Medicine (AAPM) Regional Calibration laboratories which are currently functioning but used primarily for radiation therapy.

One last and important area, to achieve accuracy in radiation measurements, is the development of criteria for operation and accreditation of laboratories, measurement quality assurance, and performance test for people making field measurements. These criteria are not only desirable but also nearly mandatory at this point in time.

I would like to thank Ms. Alice Holte and Ms. Sue Gulick for their clerical assistance and patience with the Author.

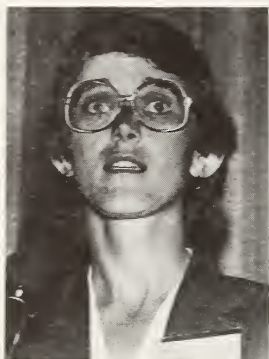
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THE 1980s FOOD MARKETPLACE DEMOGRAPHICS, LIFESTYLES, AND TECHNOLOGY

Presented by JEANNE WARREN EAGLE, Consultant,
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INTRODUCTION



For the past 30 years, we experienced very rapid economic and population growth accompanied by dramatic technological advancements. By 1980, there will be some definite sociological and economic structural changes in the United States, as we learn how to live with these changes. During this period of adjustment, demographics, social attitudes, economics, and the political environment will come into focus in the marketplace. We all want some clues about the market place. I

will highlight demographic changes, lifestyle choices, and technological issues for the food industry for the next decade.

DEMOGRAPHICS - WHAT CHANGES WILL OCCUR IN THE NEXT DECADE?

The generation that caused rapid growth in sales of infant products in the 1950s created a new mass teenage market in the 60s. The same generation produced an uncommitted, non-traditional young adult in the 70s who will mature to middle-age and raise his family in the 1980s. The total U.S. population will increase ten percent, or over 21 million people between 1980 and 1990. (That is two and a half times the number of people in the New York metropolitan area.) All of us interested in the marketplace want to know where the major changes will be taking place, who will have the consumer dollar, and what the attitudes of these groups will be by 1990. First, I will outline some major demographic changes.

CHANGES IN THE POPULATION MIX

Table 1 provides a quick look at relative changes for each of the major age groups. Table 2 shows the relative size of age groups in 1980 and 1990. There will be a decline in this period in the 14-24 age groups; thus, products associated singularly with that market will decline. The fastest growth throughout the period

will be in the 35-44 age group, but the 25-34 age group will be most important to the marketplace in absolute numbers. Those people from the peak of the baby boom will be 23 years old this year; the first of the baby boom will be 34 years old. The median age was 28.0 in 1970, 30.2 in 1978, and is projected to be 32.8 in 1980¹. The increase in the youth group results from the children of the postwar baby boom having their own children, maturing of the women's lib movement, and mechanisms in the system that allow women to have children and still pursue a career.

Table 1. U.S. population in millions of people for 1980 and 1990 by age group.

Age Group	1980	1990	Change	% Change
	Millions	Millions	Millions	
<14	46.2	52.0	+5.8	+12.5
14-17	15.8	12.8	-3.0	-19.0
18-24	29.5	25.1	-4.3	-14.6
25-34	36.2	41.1	+4.9	+13.6
35-44	25.7	36.6	+10.9	+42.3
45-54	22.7	25.3	+2.6	+11.5
55-64	21.2	20.8	-0.4	-2.0
>65	24.9	29.8	+4.9	19.6
Total	222.2	243.5		

Source: Based on information from U.S. Department of Commerce, Bureau of the Census, CPR Series P-25, No. 704, Series II.

Table 2. Percent of U.S. population by age group for 1980 and 1990.

Age Group	1980	1990
	%	%
<14	20.8	21.4
14-17	7.1	5.3
18-24	13.3	10.3
25-34	16.3	16.9
35-44	11.6	15.0
45-54	10.2	10.4
55-64	9.5	8.5
>65	11.2	12.2
Total	100.0%	100.0%

Source: Based on information from U.S. Department of Commerce, Bureau of the Census, CPR Series P-25, No. 704, Series II.

¹U.S. Department of Commerce, Bureau of Census. CPR Series P-25, No. 704, Series II and Census of Population, 1970.

REGIONAL GROWTH

Growth by 1990, in terms of actual numbers of people, will occur as shown in table 3.

Table 3. U.S. regional population growth in millions of people - 1980-1990.

	<u>Increase in population 1980-1990 in millions of people</u>
North Central	+ 13.0
South	+ 10.6
West	+ 5.8
Northeast	+ 2.0

Source: U.S. Department of Commerce, Bureau of the Census, CPR Series P-25, No. 796, Series II B.

HOUSEHOLD FORMATION

The growth, size, and form of households is also important in the marketplace. In the past ten years, the number of households went up 2.5 percent/year; in the next five years, it will be just slightly lower at 2.4 percent/year, slowing to an additional 1.4 percent/year in the last half of the decade; i.e., 63 million households in 1970, 80 million in 1980, and almost 97 million by 1990. Peering inside the 1990 households, we see other changes. As most of us expected, the average household size continued to decrease. In 1970, it was averaging 3.14 persons; in 1980, it is 2.73, and by 1990, it will be 2.47. In fact, by 1990, more people will be choosing to live alone than marry, bringing all single person households to 25 percent of all households by 1990. That has important implications for the food industry for both in-home and out-of-home eating.

THE 1980s: THE MANAGING OF LIFESTYLE CHOICES BY THE INDIVIDUAL

The 1980s will be a period of the managing of life-style choices by the individual. There will be a continued increase in the real consumer dollar available for spending by 1990, partially as a result of the increase in the population reaching career ages, and the increased education and

sophistication for money-earning ability of this population, but we also know that we will have increasing costs and increasing inflation. What we really want to know is how is the consumer going to allocate the consumer dollar in the marketplace and this is determined by the lifestyle choices we make.

Through the 1970s, there was a basic shift in the importance of individual choice. The early 70s was a reactionary period and was dubbed "the Me Generation." By the late 1970s, we called it "the period of self-indulgence." In the 1980s, we will see a refinement in these attitudes; it will be a period where the individual manages his lifestyle choice by balancing his own set of interrelated, yet often conflicting, attitudes.

MANAGING INFLATION AND ENERGY

Over the next ten years, we are going to see people making lifestyle choices to help manage inflation. Over the past two decades, we have increased our standard of living and our expectations of what we want from life. At the same time, our incomes were increasing in parallel; thus, what we wanted, we bought! Now, however, there is a growing gap--income levels are rising more slowly and are not keeping pace with our expectations. How we manage that gap has important implications for the marketplace over the next ten years. We probably have two choices: one option is to continue flashing that credit card while draining our savings. These, however, are temporary moves. In the long run, the second option is probably going to prevail: we will accept some changes in our standard of living. We will probably make fewer purchases, buy higher quality items; we will keep durables longer; we will make more careful selection of food products. By 1990, we will drive a much more fuel-efficient car, vacation closer to home, stay home more often, and entertain less. We will find other convenient ways to cut back and those who can handle the mortgage will find they may purchase a smaller, more manageable home. As we have heard, the average household size over the next ten years will also be declining. This will put a damper on the "bigger and better" markets and support a continued need for one-and two-person housing, furnishings, and products for that household.

BALANCING OF TIME AND MONEY/NEW PRODUCTS

By 1990, more services will be purchased if they improve the quality of life, increase discretionary time, or allow both men and women to work and maintain the home. Consumers will look for new products that will

save time, money, or energy, but products will have to promise much in order to get the consumer to "buy in" or trade up" in this time of income constraint.

URBANIZATION

We will also see over the next ten years a restabilization of the central cities, though the central cities will never regain their former size. A narrow exurbia will encircle the suburban parameter.

WOMEN CONTINUE TO MOVE INTO THE WORKFORCE

Women will continue to move into the workforce, although the increase will be at a slower rate. In terms of dollar income, the importance of the women working will continue to increase rapidly because more women will be moving into higher-paying jobs. At present, only about 20 percent of all management positions are held by women. We expect this to increase, so look out! With women moving into the workforce, it leaves both the man and the woman freer to make mid-career and lifestyle choices and the percent of part-time and temporary work will increase for both men and women.

ACCOUNTABILITY

In this next decade, there will be a continued expectation that the industry can be held accountable. Industry will be expected to provide quality products, reasonable pricing, durability; the industry will be expected to bear increasing risks in a fluctuating social/political environment.

HEALTH, NUTRITION, PHYSICAL WELL-BEING

Nutrition and fitness will remain hot topics as long as the perception prevails that healthiness means happiness. We will see a continued slow change in food consumption patterns and continued consumer pressures for more information about food. Medical and health insurances are actually considered necessities and we will see universal use of the health maintenance organization to reduce costs and to "prevent medical disasters."

EATING PATTERNS BECOME INDIVIDUALIZED

The family breakfast and lunch become part of our history; and even the evening meals may be individually prepared and consumed.

FOOD PURCHASE PATTERNS

More men and teenagers will buy food and prepare meals. By the 1990s as many as 60 percent of men in all households will be consistently involved in the purchase of food. By 1985, 40 cents out of every dollar will be spent on "food away from home" and households will be making fewer trips per week instead of three by the mid-1980s. For many households, convenience stores will supplement one weekly supermarket trip.

TECHNOLOGY

In theory, basic research and applied R&D lead to technology². Basic research results are random. Innovation is planned for and makes use of economies of scale. The process of innovation (technology) is a difficult one, and it requires time and resources. Most experts in the field of technology forecasting seem to agree that the rate and direction of innovation is influenced by 1) demand; 2) cost of inputs/availability of resources; 3) competitive pressures; and 4) technological capabilities. Demand for a type of product or process that is not satisfied by the marketplace (or even the potential of a demand) can stimulate the basic research and technology development process. On the other hand, a discovered principle may wait years for a suitable application, or it can create a demand and thus the innovation process commences. It takes about ten years for basic research to be applied. Therefore, we already should know in 1980, what can be applied through this decade. To forecast the technology issues we will face in 1990, you need to be aware of basic research in the 1980s.

SOME EXAMPLES OF AREAS OF BASIC RESEARCH IN THE 1980s CREATING TECHNOLOGICAL ISSUES BY 1990

First, let me suggest just a few areas of basic research in the 1980s of interest in the food industry. Such research may produce random results that could affect technology as we enter the 1990s.

²This theory has been declared by some technological experts to be invalid. They argue that this process - Basic Research - applied R&D - technological innovation, cannot be documented in more than a few isolated situations. They go on to say that many studies of the process have been made with no significant findings that indeed one leads to the other. Basic research, they say, is generally directed by academic scientists, while technology is driven by the needs of the marketplace.

By 1990, we will have made dramatic progress in basic biology. Our understanding of, and our ability to manipulate biology are still very primitive. It is believed that the impact on industry of increasing our knowledge in this field could be comparable to that of the growth of physics and electronics, and raises vastly more complex social and moral issues.

Over the next 10 to 15 years, we expect increased knowledge about tissue cultures resulting in the ability to reproduce identical culture strains. This will reduce the tissue requirements for plant genetics and hybridization research for faster improved application technologies to respond to changing environmental conditions and needs, including an increased ability to respond to predicted long-term world food shortages.

Animal breeding research continues with little expectation of new research findings in the near term for beef animals due to long breeding cycles and difficulties of repetitive research.

It is quite popular right now to push for more research concerning the function of macromutrients and their relationship to disease, the interactions and bio-availability of nutrients in foods, and human requirements for the trace elements. It is quite possible, if such a push does, indeed, result in increased basic research in these areas, that we may know more in 1990 than we do now.

Although research on obesity will continue, magic answers to fat dissolution will still elude us - instead, there may be other ways of regulating adipose tissue development, particularly in the infant.

Many expect (many more hope, do you?) that we will have the basic research results by 1990 to commence moderation of the degenerative processes.

We hope to have more answers to questions regarding the role of genetics and biochemistry in the development of taste.

THE 1980s - APPLICATION OF TECHNOLOGIES FOR FOOD MANUFACTURING

For the food industry, the 1980s will be a period of application of technological principles, most of which are already known, many from other disciplines. One of the constraints of innovation will be double-digit inflation; in such an environment industry is less likely to

assume the long-term risk necessary to spur innovation. Adequate incentives for the industry do not exist. In mature industries (e.g., the food industry) it takes a bigger piece of technology to create a sensation that it did a decade ago, because products are pretty well satisfying market demand. Thus, mature industries have turned their focus to product costs and production efficiencies. Selection of manufacturing process technologies will depend importantly on their efficient use of energy, labor, and raw materials. With the burdens of energy costs, inflation, cost of capital, and credit tightening, industry will be looking for ways to reduce costs, reduce waste, minimize labor, and maximize quality. The focus is on those factors whose costs may experience the strongest increase. In the 1980s the food industry is in a position to benefit from technological spillover from innovative areas, such as intelligent electronics, and thus may be recycled into a growth pattern.

One of the most important changes we will see in the next decade will be in information technology. Application of this technology will cause many changes in the way man functions and corporations operate in the environment in both new mass communications media and intelligent electronic devices. The impact could eventually exceed the impact of the industrial revolution.

Also, in the area of information technologies, the 1980s will continue to witness a creative application of intelligent electronics--microprocessors with a logic and a memory, for example. But even by the 1990s, we will not know what is critical to future innovation, how far we can go with the electronic memory. At this point, we have only scratched the surface of the human mind's functions. As it is, technological devices are appearing faster than man can incorporate them. One of the activities of the 1990s will be prevalent in the food processing industry. There will be sensors for temperature, pressure, and additional properties such as texture. Applications could also include analytical measures to maintain nutrient content. Actually, the food industry lags behind other industries in the use of process controls due to sanitation requirements, seasonality of plants, and limited size of some plants. But pressures for more on-line process controls include increased legislation, need for more computerized recording, increased need for efficiency in production, less waste, increased quality of product, better quality control, less hold-up for lab testing.

Energy costs will continue to be the major force for change in the food industry. It is particularly of concern to water-intensive processes. Reverse osmosis is

a process in which water is partially removed through the use of an RO membrane without heat. Applications in the 1980s include corn refining, sugar, juices, milk, and waste operations.

We forecast that in the 1980s we will also see 1) increased use of grain to make chemical feedstock to replace petrochemicals; 2) superficial fluids applications to foods; 3) increased use of enzymes; and 4) application of catalysts technology to improve contribution of chemicals from fuels, giving us chemical materials with different properties and maybe new plastics packaging materials. We will see alternative production methods such as hydroponics, mariculture, new storage methods, such as controlled atmosphere, and new packaging, and even such things as completely automated warehousing.

CONSUMER PRODUCTS

By 1990, we will have TVs with which we can hold conversations, microwave ovens that tell us how to cook the stroganoff and call us to dinner when it is ready, and lots of "toys"--video recorders, home computers, programmable appliances. Right now, for less than \$550, a home computer can be purchased that can help in household management. By 1990, we will use TV to scan catalogs, want-ads, and recipes, and computers to maintain household inventory and measure energy consumption. The way consumers shop will be dramatically different by the early 1990s, as time and energy needs drive the movement toward at-home ordering for inventory products. The rudiments are already in place with the UPC code, principles of the home computer, telephone-to-warehouse shopping, and experimental television usage.

While the 1980s will probably not be remembered as a time of great innovation in other consumer products and services, there will be labor and energy savings introductions. By 1990, the food industry will be facing a new round of innovation in product development--products to fit the programmed appliances, redesigned or new energy efficient appliances, and products that incorporate new research information on nutritional requirements and metabolism.

THE SYSTEM OF CONTROL OF PREPACKAGED
PRODUCTS IN THE NETHERLANDS

Presented by ANTON C. BIJLOO, Director Metrology Service,
Van Swinden Laboratorium, VSL, Delft the Netherlands



Recently, a new system of control of prepackaged products was introduced in the Netherlands, to supplement the existing regulations in this field. As a result of treaties within the European Economic Community, this new system follows the Common Market directives concerning the control of prepackaged products. Directives of this kind were formulated in Brussels in deliberations among the nine member states of the E.E.C. Many of these directives are intended to break down the trade barriers created by the differences in the regulations of the different member states.

It is obvious that it is difficult for manufacturers exporting their products to various countries to comply with different regulations which in some cases may even be contradictory. Some countries also try to protect their own industry by imposing regulations that make it nearly impossible to import products from other countries. As the European Economic Community is primarily meant to be a common market, its authorities try to make binding regulations in such a way that trade among the nine member states meets no barriers. Several of these regulations are optional, which means that every common market country introduces the regulations into its own national law, but is allowed for the time being to maintain also its own existing regulations for its own territory.

Concerning the control on prepackages this is the situation in Holland at present. Those packers who do not want to apply the new EEC directives adopted in Dutch law, may stick to the old regulations as they have been in force for Dutch territory for a long time. In principle the old regulations are rather simple; they are based on the so-called minimum-principle. The packer has to declare the contents on each package. Furthermore, he has to see to it that at least the declared quantity is really present in the packages. In fact, for the packer to be sure that the official inspectors will never find a package containing less than declared, he must always overfill by at least three times the standard deviation.

For the control authorities this system is very convenient; it is possible to check prepackages anywhere they are found. Any prepackage in a shop has to contain at least what is declared on it. If it does not, the packer is breaking the law. Of course there may be problems in deciding whether a packer is really committing an offense or not, such as caused by drying out. But this can be solved by allowing reasonable percentages and the like. Basically this system is rather simple.

The new regulation that is now brought into the law in accordance with the EEC directives on prepackaging starts from a different point of view. This system is based on the principle of the mean contents. The packer also has to see that the nominal quantity is declared on the packages. Not the contents of the individual prepackage but the mean contents of a number of prepackages has to be equal to the quantity declared.

To make this system operational, a number of prescriptions and tolerances are laid down in the EEC directives and adopted in the national laws of the member states. The aim of these regulations is that there will be a system of control in every member state on which the other members can rely.

If a member state has a control system completely in accordance with the EEC directives then the other member states are not allowed to object to the importation of prepackages. This applies only to the contents of the prepackages, of course. The question that arises is how there can be built up a system such that all the member states can rely upon it.

One could think of a way of inspection executed by officials, using the same procedure in every member state. But you can imagine that for a reasonable frequency of such inspection an army of officials would be needed. Moreover, it is not possible to use fixed, prescribed procedures because inspection procedures often depend on the packaging procedures and these in their turn often depend on the properties of the products and the properties of the packaging material. Accordingly, a method was chosen by which the packer is placed under the obligation to carry out an inspection system in his own undertaking or factory.

This system has to be approved by the government of the member state in which the undertaking is situated. Part of this system is the obligation to record the results of the checks taken during production. Next to that, the officials visit the packers without prior notice and take

samples in accordance with a procedure of sampling and calculating. This procedure is strictly prescribed in the EEC directives and is the same in all member states. I will explain this procedure to you later on.

In the Netherlands, the assessment of the packers' own control system is done by the Services of Weights and Measures. This service evaluates the way in which, and the frequency with which, the samples are taken, the number of samples and the statistical calculation of the results.

For example, it could be of great importance to the packer that the performance of each individual filling station of a multifilling machine is controlled and recorded. Furthermore, the possibility to adjust the whole packaging process in an easy and proper way so that the prepackages are filled with the right quantity is examined. All equipment used in the packer's internal control system must be officially calibrated; and not only calibrated, but, what is very important, also deemed suitable for the job. This means that weighing machines for example must not only be calibrated but they must also have the right capacity and accuracy. Similar requirements apply to all other kinds of equipment needed for measuring volume and density, if the prepackaged products are sold by volume and controlled by weighing.

Sometimes very special equipment is involved, such as for measuring the density of aerosols in pressure containers. This equipment is also calibrated. The packer has to record the results of his own checks. The way of recording is also evaluated by the Service of Weights and Measures. The records must clearly show what is found and if necessary, what is done to adjust the packaging machines to turn out the required contents within the given tolerances. The records must be preserved for at least one year and must be shown to the officials who visit at irregular times to inspect the whole procedure.

The whole of the evaluation of the packager's control-procedures is carried out by the Service of Weights and Measures. For these evaluations there are no strict rules. The procedure is mainly based on the know-how of the Inspectors of Weights and Measures in charge. However in case of doubt they tend to communicate with colleagues in one or more of the other member states to solve the problems that have arisen. When an evaluation is completed, the whole of the findings on the approved control system is described in a report. This report is given to the packer and to the control authorities involved.

These authorities are not only the Inspectors of Weights and Measures but also the Inspectors of the Food Control Services.

When these inspectors pay their visits at irregular intervals to do their own checks, they check whether the packer has not changed the control procedure laid down in the report. If the packer wishes to change his own internal procedure, he has to ask the Service of Weights and Measures for a re-evaluation. As I stated, the checks made by the inspectors are strictly prescribed in the EEC directives.

One might ask: why shouldn't a packer use the same control procedure as the inspectors use; then he can expect the least trouble. Well, the official procedure is rather extensive. It is intended to give a good idea of the situation of a batch of prepackages. This method is not suitable for frequent sample taking nor for following the packaging process in an adequate way.

To prove that the prepackages are filled in accordance with EEC prescriptions, the packer, once evaluated and his system approved, has the right to print the letter e on the packages. This letter must have a special form



When a packer prints this letter on his package without authorization he is committing an offense. Next to this letter e, on every package must be printed the net contents and an identification of the packer.

The new EEC regulations are used only for prepackages between 5 g and 10 kg or between 5 mL and 10 liters.

Now about tolerances. There are three conditions to fulfill. First of all, the mean contents of the prepackages must not be less than the declared nominal contents. You see that here the principle of the minimum quantity has been abandoned in favor of the mean quantity. This has had important consequences.

Of course it is not possible for the inspector to check a whole batch. So he takes one or more samples.

The sampling procedure is prescribed rather strictly as I will show you. No longer is the packer obliged to take care that every package is at least of the nominal weight. Accordingly, the inspector always has to check a sample out of a whole batch of prepackages to verify if the mean contents is right.

In practice this means that it is no longer possible to take prepackages from a store. Samples have to be taken from the warehouses of the packers or even better, directly from the packaging lines at the filling machines. In doing so, it is really an advantage that there is no need to consider the effects of drying out of products. For practical reasons the samples are nearly always taken from the production of each filling line in a factory and not from the production of the factory as a whole.

A second requirement is postulated for the individual packages. The tolerances for the individual packages are given in the next table.

Nominal Quantity Q_n in g or mL	Tolerable Negative Error	
	% of Q_n	g or mL
5 - 50	9	-
50 - 100	-	4.5
100 - 200	4.5	-
200 - 300	-	9
300 - 500	3	-
500 - 1000	-	15
1000 - 10000	1.5	-

The tolerance is only minus and depends on the nominal quantity. It varies from 9 percent for the smaller quantities to 1.5 percent for the larger quantities. The intervals where an absolute value is given are steps between the intervals with percentage tolerances.

In sampling, and in the following calculations, a confidence level of 2.5 percent is taken into account. This means that a certain number of packages out of the

sample is allowed to have a larger negative error than the given tolerance. However, to restrict the possibility of the error being too large there is this third condition: A package with a negative error of more than twice the given tolerance may never bear the EEC mark. This means in practice that they must never be found at the end of a production line.

For continuous production, batch size is defined as:

- a The quantity of one hour of production of a filling line when the sampling is taken during the production.
- a When a sample has to be taken out of storage, the batch is equal to the stock with the restriction that a batch is never more than 10 000 prepackages.

The first crucial question is now: how do we determine the contents of the packages? In most cases we shall try to find the net contents by weighing. Even if a liquid is prepacked, in general we try to determine its density and calculate the contents by weighing. This is no doubt the most accurate way. However for liquids packed in bottles, there is nowadays another method which will be discussed later on.

The next question is whether we have to open all the packages out of the sample. Also, do we test destructively or nondestructively. Of course we will try to test nondestructively, but this depends on the dispersion of the tare weights of the empty packages. When this dispersion is not too large it is very well possible to use the mean tare weight and to subtract this from the gross weight of the individual packages of the sample. However, if the dispersion is too great, it is necessary to work with individual tare weights for the individual prepackages in the sample. Mainly the dispersion of the tare weight is determined by weighing at least 10 empty packages.

These are the limits.

Individual Tare Net Weighing

$$\left\{ \begin{array}{l} S_{\tau} \geq \bar{F}_{\max} \\ \left(\bar{F}_{\max} > S_{\tau} > 0.25 \bar{F}_{\max} \right) \\ \frac{\bar{F}_{\tau}}{\bar{F}_{\tau}} > 10\% Q_{\tau} \end{array} \right\}$$

Mean Tare Admitted

$$\left\{ \begin{array}{l} S_t \leq 0.25 F_{\max} \\ F_{\max} > S_t > 0.25 F_{\max} \\ \bar{X}_t \leq 10\% Q_n \end{array} \right\}$$

- o If the standard deviation of the tare weight (S_t) is smaller than or equal to $\frac{1}{4}$ of the minus tolerance (F_{\max}) on the contents, the mean tare weight may be used.
- o If the standard deviation is larger than $\frac{1}{4}$ of the minus tolerance on the contents but smaller than that tolerance, and when at the same time the mean tare weight of the package (\bar{X}_t) is less than or equal to $1/10$ of the net weight of the contents, then also the mean tare weight may be used.

In these two cases it is possible to test nondestructively. That is to say that when samples are taken out of storage, it is necessary to open at least ten packages to determine the tare weight of the empty packages. In all other cases it is no longer possible to work with a mean tare weight.

Still, it is possible to test nondestructively provided the samples are taken out of the production line. Then a number of packages or containers at least equal to the size of the sample are marked and weighed first and then brought into the production line. At the end of the line they can be picked up again and checked. So every package can be corrected for its own individual tare. It is wise to mark and weigh a few more packages than the exact number of the sample since, in practice, very often a few marked packages pass the check point unseen.

If it is necessary to take the sample out of storage the only possible procedure is to test in a destructive way; all the prepackages have to be opened and the net contents has to be determined individually.

For the nondestructive sampling procedure the following schedule is used.

Batch Size	No.	Sample Size	Aggregate	Acc.	Rej.
100 - 500	1	30	30	1	3
	2	30	60	4	5
501 - 3200	1	50	50	2	5
	2	50	100	6	7
3201 and over	1	80	80	3	7
	2	80	160	8	9

When a batch is smaller than 100 pieces a sample is not taken but the whole batch is controlled. Normally this situation hardly ever occurs.

The size of the sample depends on the size of the batch. For example, in a batch of 500 prepackages, the number in the sample is 30 packages. Now first of all the contents of the individual prepackages is checked. If in this sample no more than one package is found, with a negative error between once and twice the tolerance, the batch is accepted. If three or more packages are found with a negative error of between one and two times the tolerance, the batch is rejected. If two packages are found with a negative error of between one and two times the tolerance, another sample of 30 prepackages is taken. This second sample is added to the first. So there is now a total sample of 60 packages. If in the total sample there are not more than four packages with a negative error between one and two times the tolerance, the batch is accepted. But if there are now five or more packages with such a negative error the batch is rejected. If in one of the samples there is only one package with a negative error larger than twice the tolerance, the batch is of course, rejected because such a package should never be found in a batch.

If it is decided that a destructive test must be carried out, this table applies.

Batch Size	Sample Size	Acc.	Rej.
100 and over	20	1	2

From batches equal to or larger than 100 packages the sample should always be 20 packages. Now only one package with a negative error between one and two times the tolerance is acceptable but when two or more of these are found the batch is rejected.

Batches of less than 100 prepackages which should be tested in the destructive way are not checked at all. This case occurs very rarely.

Thus after every package in the sample has been checked, the mean of the sample is calculated and also the standard deviation with the well-known formulas.

$$\bar{x} = \frac{\sum x}{n}$$

$$s = \sqrt{\frac{\sum x^2 - \frac{(\sum x)^2}{n}}{n-1}}$$

Or:

$$s = \sqrt{\frac{\sum x^2 - n(\bar{x})^2}{n-1}}$$

The mean is tested according to the following table.

Sample Size	Acceptance Criterion	Rejection Criterion
20	- 0.640 s	- 0.640 s
30	- 0.503 s	- 0.503 s
50	- 0.379 s	- 0.379 s
60	$\bar{x} \geq Q_n$ - 0.344 s	$\bar{x} < Q_n$ - 0.344 s
80	- 0.296 s	- 0.296 s
100	- 0.263 s	- 0.263 s
160	- 0.204 s	- 0.204 s

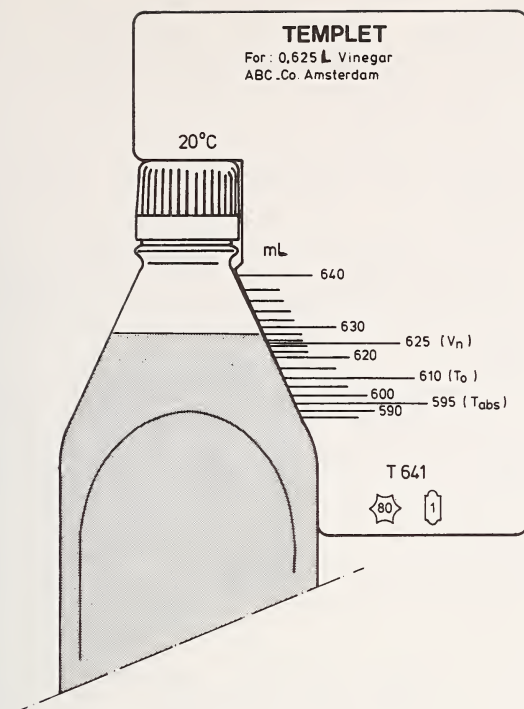
In these formulas Q_n is the nominal contents of the prepackages and s is the standard deviation. Partly this table is taken from the EEC directives and expanded in the Dutch law and is based on Student's t-test with a 0.995 confidence level for the mean. Here also, as said

regarding the individual checks on the contents of the packages, depending on whether the sample fulfills these demands or not, the whole batch is approved or rejected. If a batch is rejected the packer commits an offense and the disapproved batch cannot be sold.

Especially when bottles are used as packaging material, the dispersion in tare weight is usually so wide and hence the standard deviation in the tare weight so large, that the method of using the mean tare weight very often is impossible to apply. This is regrettable, because it is rather labor intensive to weigh and mark every bottle of a sample before the filling procedure and then take them out of the production line for weighing again afterwards. This is a lot of work not only for the inspectors, but also for the packer in his own checking procedure. So, for the control of prepackaged products in bottles another system has been developed.

The basis of this system is that the bottles themselves can serve as measures for checking the contents. Therefore the bottles must be produced in such a way that they satisfy a number of specifications concerning their shape and regularity. There is an EEC directive dealing with these bottles. In the Netherlands this directive is also brought into the national law. This means that the Service of Weights and Measures controls by sampling the production of such bottles on their specification.

Here, in the same way as with the control system on the prepackages, it is important that the producer has his own evaluated control system. The bottles are marked with a special EEC mark and an officially approved trade mark. Also in the glass of the bottle there are some figures giving the nominal contents, the contents brimful or the number of millimeters representing the distance between the level of the liquid and the rim, if filled to the nominal capacity. These bottles, which have a constant form, may be used as a means of control, but only in combination with a height measurement device.



Such a device can be a templet. A templet is made following the shape of a specific bottle and is only usable for that specific bottle. These templets are designed by the Service of Weights and Measures, as a kind of type approval of a measuring instrument. Derived from the design, as many templets as required by the user are made to control his filling lines. All these templets must be calibrated by the Service of Weights and Measures. This calibration is the official verification that each templet corresponds with the original design within given tolerances.

Usually the templets are made of stainless steel or if a great number is required of plastic. Normally the templet is placed over the bottle and over the closure which is included in the design. In the design of the templet all the uncertainties, as for example the possible differences in thickness of the closure, are rounded off to the advantage of the consumer. So when the bottles are filled to the right level according to the templet they are in fact slightly over-filled. This means that when the inspectors arrive at a good result for the

samples, they can approve the batches sampled. But when results are not good they cannot conclude that the batch has to be rejected. In that case they have to carry out a check using the weighing procedure to find the real contents of each bottle before deciding whether the batch is to be rejected or not.

On the templet there are a number of lines of which the most important are

- o the line giving the nominal volume V
- o the line giving the tolerance in $\min^n T$
- o the line giving the double tolerance in $\min^o T_{\text{abs}}$.

The rest of the lines are for determining the approximate contents of the bottle. In this way an average contents of the bottles in a sample can be calculated. This combination of bottle and matching templet provides an easy way to check the filling of bottles in a quick way. The templet is designed on the basis of measuring one hundred bottles with an EEC mark. The mean shape of these bottles is determined. So much about the regulations.

Now I would like to show you some slides showing the equipment we use. Experience has shown that in many factories there is no suitable accommodation for inspectors to work in a proper way; even a really rigid table may be missing. Therefore the inspector takes his own equipment with him. Figure 1 is a trolley which is transported by a van. The trolley can be fixed horizontally on the floor so that the top of it forms a rigid table for the weighing machine (fig. 2).

In the trolley are stowed away three electronic weighing machines with a capacity of

- o 1200 g with scale divisions of 0.01 g
- o 8000 g with scale divisions of 0.1 g and
- o 16 kg with scale division of 0.1 g (fig. 3).

Via interfaces these weighing machines are connected to a calculator. The entire system is fully automatic and controlled by the calculator. The inspector has only to feed the calculator with the data asked for by the calculator such as

- o nominal quantity of the prepackages checked
- o production per hour or size of the batch
- o name of the packer
- o product
- o etc.

Now a number of possibilities which may occur are programmed. For working with the mean tare of the packages, the program flow is as follows: The calculator demands the placing on the weighing machine of the gross weight of the prepackages in standard weights. The error of the weighing machine is taken into the memory of the calculator and all the next weighings are corrected to the right values. Now all the prepackages of the sample are placed on the weighing scale one by one. The correct weight is memorized, the given tare weight is subtracted and the net weight is printed. After reaching the needed number of packages the weighing machine is blocked automatically by the calculator. Now the mean and the standard deviation are calculated and printed. Furthermore, the printer gives the number of packages with a net weight between the limits of one and two times the minus tolerance. This number is compared with the memorized critical numbers of the EEC tables. The printer tells whether the batch is approved, rejected, or when a second sample has to be taken.

When packages are found with a contents of less than twice the tolerance the printer gives the number of them and indicates also that the batch is rejected. In the same way the calculator prints out the mean and also the decision as to acceptance or not. Finally, the printer indicates when the packer should be fined.

All the data are put on tape and at the head office of the Service of Weights and Measures read out and stored in a computer. So we have a view of all the inspections and their results.

In the trolley there are several instruments which may be needed for inspection. To determine the density of a liquid the so called "Gammaball" is often used. This ball is fixed to a rod (fig. 4). When the ball is immersed in a liquid up to a marking on the rod, a volume of exactly 100 cm³ is displaced. So if the liquid is in a glass or container placed on a weighing machine which is tared to zero the force reacting to the buoyancy gives a reading in grams on the display that is equal to the density of the liquid in grams per 100 cm³.

To determine the density of corrosive liquids it is preferable not to use the gammaball but to use other means, as for example glass pycnometers, measuring cylinders, and aerometers. Special instruments exist for determining the density of aerosols and of pastes. A special method is followed to find the density of a liquid with carbon dioxide in solution.

The trolley has a cable for connecting to a power supply and holds several useful things such as boots, ear protectors, and tools. Inspection can thus be carried out quickly and the possibility of the inspector making mistakes is nearly nil.

This survey I have given you of the way in which we in Holland control prepackaging can, of course, not be complete. Nevertheless, I hope to have given you a general idea.

As I stated, at this moment we have only an optional system which is meant in the first place to break down trade barriers within the Common Market. However, I foresee for the near future that in Holland this system will become the only system for all prepackaged products because there is an increasing need for more consumer protection as regards delivered quantities. For the years to come I also expect an increase in the cooperation between government and industry and not only in this field of prepackaging. One can see this increase in cooperation in Europe in many fields and I believe that this is a very good thing.

Thank you for your attention.



Figure 1. Trolley transported by van

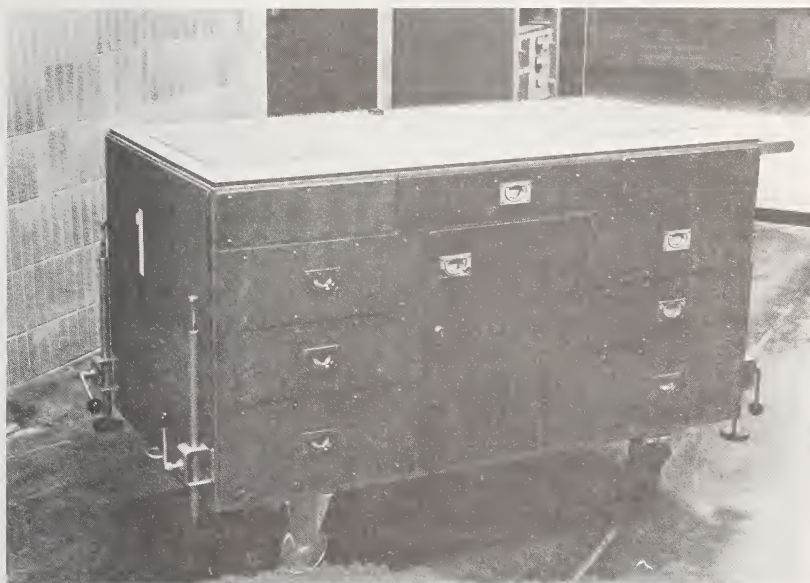


Figure 2. Trolley top forms rigid table

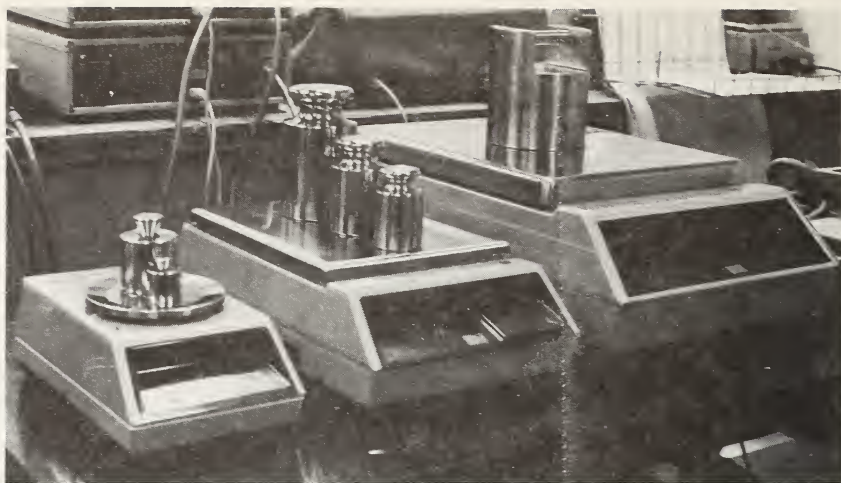


Figure 3. Three electronic weighing machines



Figure 4. Gammaball fixed to rod

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REPORTS OF STANDING COMMITTEES

The following is a list of designated State representatives who were present and voting on the reports presented by the Conference standing and annual committees:

<u>State</u>	<u>Representative</u>	<u>Alternate</u>
1. Alabama (AL)	John B. Rabb	Don Stagg
2. Alaska (AK)	Joseph L. Swanson	James E. Snyder
3. Arizona (AZ)	P. M. Fullinwider	D. L. Sorensen
4. Arkansas (AR)	Sam F. Hindsman	Ed Holiman
5. California (CA)	Ezio F. Delfino	Darrell A. Guensler
6. Colorado (CO)	Leo Letey	---
7. Connecticut (CT)	John Bennett	Guy J. Tommasi
8. Delaware (DE)	Eugene Keeley	---
9. District of Columbia (DC)	Absent	---
10. Florida (FL)	Stan J. Darsey	W. A. Cogburn, Jr.
11. Georgia (GA)	Tom Kirby	S. S. Abercrombie
12. Hawaii (HI)	Absent	---
13. Idaho (ID)	Lyman D. Holloway	---
14. Illinois (IL)	Sidney A. Colbrook	Wayne W. Behrns
15. Indiana (IN)	Robert W. Walker	M. Morris Thompson
16. Iowa (IA)	James M. O'Connor	Robert E. Hollis
17. Kansas (KS)	John L. O'Neill	Harold Hedge
18. Kentucky (KY)	Ron Egnew	---
19. Louisiana (LA)	Philip A. Stagg	James L. Mahomes
20. Maine (ME)	Gaylon M. Kennedy	Marshall White
21. Maryland (MD)	Richard L. Thompson	Lacy H. DeGrange
22. Massachusetts (MA)	Edward H. Stadolnik	---
23. Michigan (MI)	Edward C. Heffron	Frank Nagele
24. Minnesota (MN)	Edward P. Skluzacek	George W. MacDonald
25. Mississippi (MS)	Absent	---
26. Missouri (MO)	Bob Merrick	Jack Pierce
27. Montana (MT)	Absent	---
28. Nebraska (NE)	John Alloway	Rick Loock
29. Nevada (NV)	Absent	---
30. New Hampshire (NH)	Walter J. Tusen	---
31. New Jersey (NJ)	James R. Bird	Carl Conrad
32. New Mexico (NM)	Charles H. Greene	Fred A. Gerk
33. New York (NY)	John J. Bartfai	Kenneth R. Gridley
34. North Carolina (NC)	N. David Smith	Tom Scott
35. North Dakota (ND)	Bruce Niebergall	---
36. Ohio (OH)	Kenneth R. Adcock	James C. Truex
37. Oklahoma (OK)	Absent	---
38. Oregon (OR)	Kendrick J. Simila	James F. Clifford
39. Pennsylvania (PA)	Fred A. Thomas	---
40. Puerto Rico (PR)	Maria A. Maldonado	Juan A. Rios
41. Rhode Island (RI)	Absent	---
42. South Carolina (SC)	Charles T. Smith	Carol P. Fulmer
43. South Dakota (SD)	Allen Christie	---
44. Tennessee (TN)	John Shelton	Robert G. Williams
45. Texas (TX)	Charles E. Forester	---
46. Utah (UT)	Edison Stephens	Archie S. Hurst
47. Vermont (VT)	Trafford F. Brink	Douglas Jones, Sr.
48. Virginia (VA)	James F. Lyles	Marion W. Cain
49. Virgin Islands (VI)	Absent	---
50. Washington (WA)	John H. Lewis	William C. Sullivan
51. West Virginia (WV)	Vivian Kidd	---
52. Wisconsin (WI)	Donald J. Soberg	Robert Probst
53. Wyoming (WY)	Absent	---

REPORT OF THE COMMITTEE ON NATIONAL MEASUREMENT
POLICY AND COORDINATION

Presented by CHARLES H. VINCENT, Director,
Department of Consumer Affairs, City of Dallas, Texas

(Thursday, June 26, 1980)

VOTING KEY



100

INTRODUCTION

The Committee on National Measurement Policy and Coordination (P & C Committee) submits its final report to the 65th National Conference on Weights and Measures (NCWM). The report represents recommendations of the committee that have been formed on the basis of written and oral comments received during the year and oral presentations made during the open meeting of the committee.

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NATIONAL METROLOGICAL CONTROL PROGRAM
FOR THE UNITED STATES

Social, economic, and technological changes that have occurred during recent years suggest a need for the National Conference on Weights and Measures (NCWM) to play an active and aggressive role in shaping the future of weights and measures administration in the U.S. In response to the need, the Committee on National Measurement Policy and Coordination considers it important to initiate consideration of issues that would be fundamental to the ultimate development of a National Metrological Control Program for the United States.

It is felt that the development of a metrological control program would benefit NCWM and its member jurisdictions in a number of ways. One such potential benefit identified by the committee would be a clearer and more formalized determination of the optimum relationship between NBS and NCWM in their joint pursuit of measurement equity.

Prior to further consideration of possible development of a National Metrological Control Program, the committee feels that the following conceptual issues should be addressed:

- 1) What degree of uniformity in weights and measures enforcement policies and practices in the U.S. can be reasonably attained?
- 2) What should be the full scope of State and local weights and measures programs?
- 3) Should the examination of weights and measures devices from type approval through periodic inservice examination be a function of State and local jurisdictions exclusively?
- 4) Can an overall objective of a metrological control program be established in quantitative terms?
- 5) To what extent is the federalization of weights and measures regulation in the U.S. necessary or desirable?
- 6) What are the components of the present metrological control process and how do they relate to each other?
- 7) What types and levels of NBS support of NCWM would be optimal for assurance of measurement equity in the U.S.?
- 8) Should NBS play an active leadership or passive advisory role in U.S. weights and measures issues?
- 9) If quantitative national objectives for metrological control can be established, how can priorities for use of public and private resources be determined and utilized?
- 10) If a National Metrological Control Program is developed, would it be feasible to formalize the program by law?

The committee encourages member jurisdictions to evaluate these issues and to submit their comments and suggestions. The committee also recommends that a special study group be appointed by the NCWM Chairman to consider these and other issues that would be fundamental to the ultimate development of a National Metrological Control Program for the United States.

(Item 101 was adopted)

102 SPECIAL STUDY GROUP ON ENFORCEMENT UNIFORMITY

A fundamental objective of the National Conference on Weights and Measures (NCWM) is to encourage and promote

uniformity of requirements and practices among jurisdictions. Though the NCWM has achieved a relatively high degree of uniformity in codes and regulations that are utilized in the enforcement of measurement standards by the States, counties, cities, and territories, it must be recognized that the enforcement practices employed by the jurisdictions significantly affect the actual level of uniformity achieved in any particular program area. The lack of uniformity can be a serious deterrent to the effectiveness and continuation of State and local weights and measures programs.

A special study group has been appointed by the Conference chairman to study enforcement policies and practices utilized in package net contents control by NCWM member jurisdictions. This study group, consisting of four weights and measures officials and four associate members who represent industry, is an initial step in seeking background information on the existing enforcement practices being used in the United States. For this purpose a brief questionnaire was prepared and distributed to the States and several other jurisdictions to determine the current policies and practices being used in package control programs.

The following is a summary of the plans developed by the study group at the interim committee meetings:

A. Goal:

To achieve a high degree of uniformity in enforcement policies and practices.

B. Scope:

The issues of uniformity will be initially limited to the enforcement practices of packaged commodities. The issues can be expanded at a later date to include other areas where weights and measures enforcement is concerned but only after the issue of uniform package control has been essentially completed.

C. Objectives:

1. To identify the net content enforcement practices of the States and principal jurisdictions.
2. To identify the degree of consistency or uniformity in the enforcement practices among these jurisdictions.

3. To recommend to the National Conference on Weights and Measures through the National Measurement Policy and Coordination Committee ways and means of increasing the degree of uniformity among the various jurisdictions.

D. Approach:

Send out a questionnaire to collect information for jurisdictions on their enforcement policies and practices.

MEMBERS OF SPECIAL STUDY GROUP:

Kendrick Simila	-Co-chairman, Oregon
Chip Kloos	-Co-chairman, Hunt Wesson Foods, Inc.
James Bird	-New Jersey
Charles Greene	-New Mexico
Richard Thompson	-Maryland
Gary Hagopian	-Procter and Gamble Company
Austin Rhoads	-Milk Industry Foundation
Edward Wolski	-Colgate-Palmolive

LIST OF JURISDICTIONS RECEIVING QUESTIONNAIRE:

Fifty State weights and measures offices (plus D.C., Puerto Rico, Virgin Islands)

Akron, OH	Indianapolis, IN	New York, NY
Baltimore, MD	Kansas City, KS	Omaha, NE
Birmingham, AL	Los Angeles, CA	Philadelphia, PA
Chicago, IL	Miami, FL	Seattle, WA
Dallas, TX	Minneapolis, MN	St. Louis, MO

During the Conference, Mr. Simila and Mr. Kloos presented a report on the progress of the Study Group. Preliminary results follow:

RESPONSE TO THE QUESTIONNAIRE:

Responses to the Enforcement Policy and Practice Questionnaire were received prior to the 65th NCWM from 94 percent (50 of the 53) of the State-level jurisdictions and 60 percent (9 of 15) of the principal local jurisdictions contacted. Overall response was 87 percent (59 of 68).

PRELIMINARY FINDINGS:

Although there is a reasonably high degree of uniformity with regard to established package compliance standards, there is a significant amount of variability

in how these standards are interpreted and implemented. By standards we mean official net contents compliance requirements and not physical test standards.

The initial survey results indicate that approximately 83 percent of the respondents utilized the standards contained in the National Bureau of Standards Handbook 67 for checking standard package items. Over 70 percent of those responding indicated that official legal recognition has been given to these standards through legislative acts or administrative rule.

The average portion of all weights and measures activities devoted to net content enforcement of standard packages was shown to be approximately 6 percent. We recognize that this is a rough estimate and that the range may vary widely from less than 1 percent to over 40 percent among the various jurisdictions.

The criteria used in testing for net content compliance usually included both the sample average and unreasonable individual errors (80 percent of the respondents), but some jurisdictions indicated that they base their decision on the sample average only (8 percent) or the number of individual errors only (2 percent), while some indicated that other bases for decisions are used (10 percent). Although the vast majority utilize both criteria for compliance, only 34 percent indicated they would fail a lot if the number of unreasonable errors was excessive and only 59 percent indicated they would fail a lot if the sample average fell below the declared label contents. These results indicate that the lack of uniformity is greatest in the interpretation and application of the standards and not in the standards themselves.

In terms of the frequency of enforcement options utilized, the results indicated that marking products off-sale was most frequently used, followed by issuing a warning, assurance of compliance plea, criminal prosecution, administrative hearings, injunctions, civil penalties, and other (unspecified) options in descending order. Before legal action is taken, 86 percent of those responding indicated that they would take a second inspection sample to confirm their findings.

Again as stated above, uniform standards would be helpful in insuring uniform compliance practices, but it will not guarantee such practices. Attention must be focused on training of officials and their understanding of these standards. Further recognition must be given to

the political pressures of the job, attitude of the officials, and other factors affecting motivation before any real uniformity in practice can be achieved.

FINAL REPORT PREPARATION:

The Special Study Group intends to present its final report to the P & C Committee in ample time for consideration at the next interim committee meetings on January 18-23, 1981.

Efforts will be made after this Conference to obtain responses to the questionnaire from the nine jurisdictions that did not send in replies as of June 1980.

In the coming weeks, the Study Group will further analyze the data from the questionnaires to identify specifically what enforcement policies and practices contribute most to problems of uniformity and consistency in package net contents control. From this analysis, the group intends to develop its recommendations to the P & C Committee for ways and means of increasing the degree of uniformity among the various jurisdictions.

FURTHER ACTIVITY

The Study Group on Enforcement Uniformity has been approached concerning the possibility of expanding its study activity to cover other areas of weights and measures enforcement. Specifically the Study Group will be exploring the feasibility of becoming involved in further consideration of the issue of a national metrological control program for the United States and in participating in or assisting with the NBS-sponsored study of the Bureau's programs of assistance to State and local weights and measures authorities.

(Item 102 was adopted)

103 TASK FORCE ON NATIONAL TYPE APPROVAL

The Task Force met during the interim meetings and a number of points relating to the general subject of national type approval were discussed. The following is a summary of these matters at that time.

A progress report was made on the pilot program that is underway between the National Bureau of Standards (NBS) and the California Division of Measurement Standards. These two organizations have entered into an agreement to accept the results of each other's

prototype examinations of electronic scales and cash registers. As of January 1, 1980, California has been charging industry directly for type approval examinations and the NBS Office of Weights and Measures (OWM) had issued one report, one was waiting for review, and two were in progress under the NBS-California agreement. OWM is surveying the States to identify those jurisdictions that have the ability and desire to perform endurance testing for certain types of scales. There was a strong consensus that other jurisdictions that are willing to do endurance testing should be found as soon as possible. California and OWM have been developing check lists for endurance testing. Several questions were raised regarding "grandfathering in" devices that had received some type of examination in the past few years. Both OWM and California indicated that those particular cases would have to be examined on a case by case basis and that there could be no "blanket" grandfathering.

Mr. Ben Banks, representing the USDA Federal Grain Inspection Service (FGIS), was present at the interim meetings. It was reported that FGIS and OWM have met and discussed jurisdictional concerns among various agencies regarding type approval. There is a possibility that FGIS will concentrate on approval of grain hopper and railroad scales while relying on NBS and weights and measures jurisdictions for approval of other type scales.

Mr. Ezio Delfino, Task Force Chairman, reported that the State of California is willing to accept the type approval results of other jurisdictions, including FGIS, only if there are well defined, written, and agreed upon procedures to follow and OWM can give assurances that those procedures will or have been followed. This applies to initial verification as well as endurance testing. Mr. Al Tholen, Chief, Office of Weights and Measures, indicated that OWM will continue a commitment of one person to coordinate the national type approval effort. The task force consensus was that the first priority should be to attempt to utilize existing resources nationwide to carry on national type approval rather than encourage individual jurisdictions to build up their present capabilities.

Concern was expressed by several task force members representing industry that some jurisdictions might begin charging for type approval as a means of gaining income, and yet give the subject of reciprocity a low priority. The Task Force members agreed that there should be a well understood policy for all jurisdictions

that the goal of any type approval program should be one of working toward full reciprocity where each participating jurisdiction accepts the other's work. Any jurisdiction considering charging fees for type approval examination should first be committed to the reciprocity of type approval examination.

The Task Force wishes to commend the Scale Manufacturers Association (SMA) on its excellent paper titled, "A Legal Metrology Control System Applicable to the U.S.," which contained a detailed documentation of the existing system of manufacture, testing, installation, modification, subsequent testing, and problem areas that are applicable in the commercial measurement system. The Task Force believes the SMA paper along with an earlier proposal for a National Type Approval Program prepared by Ken Simila, State of Oregon, will be very helpful in the development of an overall type approval system.

Task Force members discussed how a national type approval program might be structured on a long range basis. After considerable discussion, the consensus appeared to be that the program should continue to develop and progress on a step by step basis with strong coordination by OWM. The relatively short term goal is to encompass as many devices and jurisdictions as possible into the system and implement any organizational changes as the need arises. More discussion of specific task assignments is needed so detailed comments are requested from Conference members. The role of private laboratories is to be explored once the performance tests and procedures are agreed upon for specific devices.

The Task Force was called upon to discuss ways in which it felt the American Society for Testing and Materials (ASTM) would strengthen and support NCWM type approval activities. It was suggested that one possible interaction in this area could be the development of criteria and test methods for type approval examinations. Generally, the Task Force members expressed concern that the involvement of ASTM could slow down Task Force activities by involving an unnecessary number of people and organizations. The Task Force believes that ASTM involvement should be carefully studied and will begin by examining pertinent existing ASTM standards to determine if they may be useful to type approval. Although direct ASTM involvement in type approval criteria is not anticipated at this time, the Task Force will consider asking for ASTM assistance on a case by case basis when it feels greater resources and input are needed, and when the issues go beyond the capability of the Conference members.

During the committee's open hearing at the Conference Mr. Delfino reported that because of scheduling difficulties, the task force would not be able to meet prior to the P & C Committee meeting but would meet later during the Conference. The following is an update on task force activities since the interim meeting:

- 1) Four devices have NBS/California approval.
- 2) Two devices have California approval; test results have been forwarded to NBS.
- 3) Seven devices are currently under consideration for approval by NBS and California.
- 4) Checklists have been agreed upon and are being used for electronic digital scales and electronic cash registers.
- 5) Draft prototype test procedures for vehicle scales, platform scales, and commuting scales have been sent to California for comment by NBS.
- 6) California has sent to NBS for comment a draft test procedure for bulk weighing systems and automated batch controller and electronic hopper scales.
- 7) Checklists are being developed for heavy capacity scales.
- 8) Checklists are in progress for compressed gases, liquid measuring devices, taximeters, and odometers.

(Item 103 was adopted)

104 INTERNATIONAL ORGANIZATION OF LEGAL METROLOGY

Since the 1979 National Conference on Weights and Measures, the International Organization of Legal Metrology (OIML) has been busy preparing for its 6th International Conference which was hosted by the United States, June 16-20, 1980, at the Department of State in Washington. The OIML International Conferences are held every four years and are very formal meetings. One main item of business during the Conference is the adoption of a quadrennial budget (1981-1984) for the operation of the International Bureau of Legal Metrology (BIML). Additionally, the Conference votes on the acceptance of proposed International Recommendations (technical standards) for

various types of measuring instruments. Such recommendations are the products of the 200 or so technical committees within OIML that are studying a wide variety of measuring instruments and methods. Further, the Conference sets policy for OIML in areas relating to international operations; relations with other international organizations; and the adoption of new work programs.

The dates of the OIML Conference were chosen to just precede the National Conference on Weights and Measures (June 22-27) in hopes that there would be a free exchange of national and international visitors to both meetings.

Harold Wollin, Executive Secretary of the National Conference on Weights and Measures, and Dave Edgerly, U.S. Program Manager for OIML, cooperated in planning arrangements for both meetings. Mr. Charles Vincent, NCWM Chairman, participated as an official member of the U.S. Delegation to the OIML conference. Several foreign officials presented papers on the legal metrology programs in their country. During the National Conference, Mr. Edgerly reported on the OIML Conference and reviewed actions that were taken on International Recommendations.

The level of technical activity in OIML during 1979 was very high. Some 40 draft International Recommendations were received by the United States for review and comment. Subject areas of interest to the weights and measures community included: fluid metering systems (water and petroleum); gas pipeline measuring systems; check-weighing and belt-conveyor scales; grain moisture, and load cells. Additionally, the United States participated in eleven OIML technical level meetings. Included in the meetings was the first international meeting of Reporting Secretariat PS7/RS8 dealing with load cells, a Secretariat chaired by the United States. Members of the National Conference participated in the U.S. Delegations to three of the eleven international meetings. Of further significance to the NCWM since its last meeting has been the creation of a new OIML Secretariat on "Electronics Associated with Weighing Devices," also under Chairmanship of the United States. This new Secretariat is drafting an International Recommendation dealing with performance requirements for weighing systems equipped with electronic components.

The relevance of OIML activities to activities of the National Conference on Weights and Measures remains strong and will, no doubt, increase over time. In this regard, the NCWM will need to continue its interest in the work of OIML and should consider appropriate means

for achieving greater uniformity between U.S. and OTMI requirements.

(Item 104 was adopted)

105

NCWM/ASTM COOPERATION

A meeting of top-level officials of the NCWM and the American Society for Testing and Materials (ASTM) was held on November 19, 1979, at ASTM headquarters in Philadelphia, Pennsylvania. The meeting was called in response to an invitation by Mr. William T. Cavanaugh, ASTM Managing Director, during his address to the 64th annual meeting of the NCWM in 1979 in Portland, Oregon. The purpose of the meeting was to explore a number of activities going on within ASTM of interest to the weights and measures community and to discuss how both NCWM and ASTM might benefit from the participation of State and local weights and measures officials on select ASTM technical committees.

A thorough review of the aims and objectives of the two organizations was provided during the meeting and presentations of ASTM and NCWM by representatives of each group. The following is a summary of some of the information and viewpoints that were exchanged:

- 1) ASTM was chartered in 1898. It presently has a permanent staff of approximately two hundred employees and it operates on an \$11 million budget which is generated from the sale of ASTM standards and from membership fees.
- 2) There are 136 technical committees and 1800 subcommittees in existence in ASTM. ASTM has about 6000 published standards and is producing some 250 new standards on an annual basis.
- 3) ASTM provides a standards process (administrative, legal, and other functions related to production of standards), but its staff does not provide technical input to standards being developed.
- 4) ASTM does not charge for its services in developing standards. If NCWM petitioned ASTM to assist in developing standards for the weights and measures community there would be no direct costs to NCWM.
- 5) ASTM has monies earmarked for assistance to some State and local government officials participating in ASTM committees. If areas of cooperation are

identified between ASTM/NCWM, financial assistance in the form of travel expenses and per diem for NCWM delegates to ASTM committees may be possible. There are some 1300-1400 State and local officials now involved in ASTM committees and subcommittees (not all of whom receive financial assistance from ASTM.)

- 6) The ASTM "process" which is predicated on openness, due process, and balanced representation of interests offers the possibility of standard practices and test methods for weighing and measuring devices that could complement NCWM outputs like NBS Handbook 44, "Specifications and Tolerances for Commercial Weighing and Measuring Devices." The existence and use of such ASTM standards should in no way diminish the role of NCWM.
- 7) There is high interest within NCWM in the development of a National Type Approval Program that will permit uniform type approval tests within those jurisdictions having such a program. A necessary ingredient to the program is standard test methods for type approval of a wide range of commercial weighing and measuring instruments. ASTM might be helpful in developing standard criteria and methods of test for type approval of devices.
- 8) ASTM might be of service to NCWM through the conduct of workshops in cooperation with NCWM/NBS in subject areas of interest to the weights and measures community (e.g., octane testing, statistics, laboratory accreditation, laboratory automation.)
- 9) Cooperation with ASTM in developing standards useful to NCWM will require private sector support and plans should be made to bring industry viewpoints into any future discussion with ASTM.
- 10) The move to increase ASTM/NCWM interaction should proceed slowly with the areas of cooperation chosen very carefully.

During the interim meetings of Conference committees at NBS, Mr. Hank Stremba, Deputy Managing Director, and Mr. Sam Etris, Special Assistant to the Managing Director of ASTM, attended several of the committee sessions and discussed some of the above points in a joint session of all committees. The committee greatly appreciates the interest and cooperation of ASTM management toward NCWM and it will continue to explore means by which our two organizations can be of benefit to each others' objectives.

At the committee's open hearing the Scale Manufacturers Association (SMA) expressed its opposition to the NCWM becoming involved in the ASTM process and stated that the NCWM should continue as a model regulator and not give up its type approval role to ASTM. The following rationale was presented by SMA:

- 1) The proposal would have a major impact on SMA's ability to support the ASTM process concurrent with its present technical obligations to the NCWM and other weights and measures related technical activities.
- 2) The consensus vs. regulatory process is an important issue with respect to ASTM involvement in the National Conference. The NCWM should fully consider these implications with respect to its prerogatives under the NCWM charter and by laws.

(Item 105 was adopted)

106 REPORT ON THE UNITED STATES METRIC BOARD

The Committee was pleased to have Mr. Sydney D. Andrews, Director, Division of Standards, State of Florida, and NCWM Representative on the United States Metric Board, attend the committee's interim meeting sessions and provide valuable input on metric matters. A summary of his report on the plans and progress of the U.S. Metric Board is given in the following paragraphs.

Since the last report given to the National Conference on Weights and Measures during the meeting in Portland in July 1979, the U.S. Metric Board has continued to hold meetings around the country - San Francisco in August, Detroit in October, and Orlando, Florida in December. The format continues to allow at least one half-day for an open forum with the public invited to present their views to the Board. Attendance has been quite good at these sessions, with some very spirited comments. The pros and cons have been pretty well balanced. The bi-monthly meetings for 1980 were scheduled for Phoenix, St. Louis, Seattle, Minneapolis, Columbus, and New Orleans. Special meetings on topical issues, such as the motor fuel dispenser forum last year, will be held as circumstances indicate need, and if funds are available.

The Board is still having difficulty finding a smooth operating mode, and because of the diversity of its membership it may never achieve this. An inordinate amount of time is spent on procedural matters, rather

than substance. However, with additional support from the staff up to full strength, continuity has improved. Committees are beginning to function, and projects are beginning to emerge. The program for coordinating State metric activities got underway in 1979.

Dr. Frank Hartman, who represents State and local governments on the Board, is in charge of this, and I have been asked to assist him. Five regional meetings were held around the country with each State invited to send a representative. Attendance was quite good with only eleven States not sending a representative. Reports from these representatives indicated metric activity in the various States varying from well organized programs to no interest at all - even apparent opposition in some. An annual meeting of State representatives is planned by the Board in the Fall of 1980 at some central location in the country to which all States will be invited to send a representative. The Board hopes to be able to provide some funds for this meeting to assist in travel expenses.

At the August 1979 meeting in San Francisco the Board passed a resolution stating its interpretation of the Metric Conversion Act of 1975, the interpretation being that the Board should be completely neutral, and should in no way promote, or facilitate metric conversion. I opposed the motion on the grounds that I do interpret the Act to intend for the Board to facilitate voluntary metrication. The motion carried thirteen to two.

Following its public forum last year on the feasibility of converting retail motor fuel dispensers to a metric mode, the Board has continued to monitor progress in this endeavor and is working with interested groups, including the NCWM. Stephen Vastagh, of the U.S. Metric Board staff, has been assigned as Project Manager for this program. The American National Metric Council's Petroleum and Natural Gas Sector Committee formed a Task Force to develop a recommended plan for making this conversion. A draft of the plan has been completed and the U.S. Metric Board is helping ANMC publicize it for comment.

The contract with Middlesex Research Corporation to make a sample searching of Federal, State, and local laws and regulations has been completed. Their conclusion was that there are no legal barriers, per se, only perceived barriers, and legal deterrents and nuisances. On the basis of this the Board has reported to the President and Congress that no new mechanism is needed to change laws or regulations to allow voluntary metrication at this

time, but that all needed changes could be made by using existing methods. A copy of this report, which is entitled "Providing a Metric Option," has been sent to each State Weights and Measures Director.

The first annual report of the Board to the President and Congress was scheduled for completion on March 1, 1980. I requested that a copy of this report be sent to all weights and measures officials.

Activities within the Federal government are responding to the considerable expansion of metric usage in the private sector. This activity is being guided by policies developed within the Interagency Committee on Metric Policy which is made up of high ranking officials of the major Federal agencies and chaired by Dr. Louis Polk, Chairman of the United States Metric Board. This committee has developed a metric policy statement which has been adopted by twenty-seven agencies. The policy states that "Federal agencies shall encourage and support an environment which facilitates metrication."

The USMB is developing, with other Federal agencies (Department of Justice, Federal Trade Commission, Department of Commerce, et alia) antitrust guidelines. The spector of antitrust violations continues to be a concern to sectors engaged in coordinated metric planning. The Board cannot offer protection from anticompetitive practices, and should not, but cooperative metric planning is essential and means must be provided for doing this without violating antitrust laws.

In response to the NCWM resolution regarding possible amendments to the Federal Fair Packaging and Labeling Act, which was directed to the USMB, the Board's General Counsel has established an interagency committee on FPLA which is made up of representatives from those Federal agencies that have responsibility for implementing this act. They will work toward developing necessary amendments for voluntary metric usage as well as exemptions, rules, and regulations to help this cause.

In response to another resolution directed to the Board, they defeated a motion to reconsider their decision to use "er" spelling for the words metre and litre.

The Board's Private Sector Committee has developed planning guidelines which have been published in the Federal Register, and a period of one year will be allowed for comments. Meanwhile, the Committee is working to develop in-house review procedures.

The Uniform Metric System Act, which is a model State metric implementation act, is under consideration by the Board. It probably will be given further study by our new State Program Committee, but the Board has such limited staff to fully review such documents that it may be some time before final action is taken. The committee received a suggestion that thorough study be given to the Uniform Metric System Act by NCWM as well. The committee intends to follow through on this suggestion and recommends that members of NCWM obtain copies of the Act from the National Conference of Commissioners on Uniform State Laws, 645 N. Michigan Avenue, Suite 510, Chicago, Illinois 60611.

The Standards Liaison Committee continues to work with all standards developing organizations. It is also working on a project guideline for giving better direction to the Committee's activities. The Research Committee is conducting a survey of the top one thousand businesses in the country to determine the extent, and cost of their metric conversion. The Public Awareness and Education Committee continues to sponsor educational and informational programs, media appearances, and speaking engagements of USMB members and staff.

A Speakers Directory is being organized by the Board for the purpose of identifying people who qualify, and have volunteered their services to present programs on metrication. Due to budget limitations no financial assistance can be offered these volunteers, but the Board will serve as a clearinghouse.

The Board received \$1,575,000 for all its activities in fiscal year 1979, and had twenty-five full-time employees. For fiscal year 1980 Congress has authorized a budget of \$2,474,000 and a staff of thirty-six permanent and twelve temporary employees. Regretfully, the Board was not authorized the 1.2 million which was requested for grant programs to assist State and local governments in metric planning, as well as other deserving metrication activities.

(Item 106 was adopted)

107

NCWM POLICY ON METRIC CONVERSION
OF RETAIL MOTOR-FUEL DEVICES (GAS PUMPS)

The Committee on National Measurement Policy and Coordination has been tracking the progress being made throughout the nation concerning the changeover from gallon measurement to the sale of gasoline by the liter.

Because of the importance of this issue and the timeliness of the policy that was adopted by the NCWM in 1979, the committee wishes to reiterate the guidelines as set forth in the policy for the benefit of those who may not be aware of them. In doing so, the committee is hopeful that those State and local jurisdictions that have not developed and issued a plan (or regulation) and timetable for full gallon measurement and computation (instead of half-gallon and half-pricing practices), or conversion to liter measurement and computation, will take such action in the immediate future. As the U.S. Metric Board stated in 1979, this is an opportune time for the development of a planned and coordinated voluntary program of dispensing gasoline by the liter; the Board noted that without this action, metric usage is likely to proceed in a haphazard fashion, leading to public confusion, disparate end results, and the negation of the positive cost advantages that a nationally planned and coordinated program offers.

STATEMENT OF CONFERENCE POLICY

The National Conference on Weights and Measures as assembled during its 64th annual meeting in Portland, Oregon, on July 22-27, 1979, adopted as its policy the recommendation that each State, county, and city in the United States implement a three-phase general plan and timetable for the eventual metric conversion of all retail motor-fuel devices. In establishing this plan and timetable, it is recognized that the conversion time within any jurisdiction will be dependent upon such factors as: local area price increases, existing device computing capabilities, replacement parts availability, and availability of "pump" repair or service personnel. It is recommended that each jurisdiction:

PHASE I - UP TO JANUARY 1, 1982

- o Allow gallon measurement and price computation per gallon.
- o Allow liter measurement and price computation per liter.
- o Allow "half-pricing per gallon" wherever devices are not capable of computing in whole gallons and total dollars. In each jurisdiction the duration of half-pricing should be held to a minimum period determined by economic and other factors in that jurisdiction.

- o Require each establishment to use exclusively only one of the measurement methods of sale (gallon, liter, or "half-pricing.") A change from one method to another must be carried out for all devices dispensing motor fuels in the establishment.
- o Require all roadside signs and similar advertisements of motor fuel offered for retail sale to be by the price per gallon or price per liter.
- o Require in the case of liter sales suitable posting of per gallon and per liter prices at the device, service island, and premises of the establishment in accordance with State and local laws, regulations, and ordinances, and in a manner which facilitates consumer comparisons between the per gallon price and the per liter price.

PHASE II - FROM JANUARY 1, 1982 THROUGH DECEMBER 31, 1982

- o Allow gallon measurement and price computation per gallon.
- o Allow liter measurement and price computation per liter.
- o Discontinue "half-pricing per gallon" methods still in use effective January 1, 1982.
- o All other requirements remain unchanged.

PHASE III - ON JANUARY 1, 1983 AND THEREAFTER

- o Encourage only liter measurement and price computation per liter.

FURTHER POLICY CONSIDERATIONS

In adopting this policy, The National Conference on Weights and Measures recognizes:

- o That the U.S. Metric Board is the logical entity to act as the focal point for the coordination and planning of all necessary details for the orderly and efficient transition to liter measurement in the sale of motor fuels at retail, and
- o The advice and assistance of the American National Metric Council, the American Petroleum Institute, the North American Gasoline Tax Conference, State Metric Councils and/or Boards, and such other

organizations as may be interested in participating in the effort are essential in addition to that of the National Conference on Weights and Measures, and

- o That comprehensive and appealing public education programs must be conducted by both government and industry to fully familiarize the public with the changeover to metric measurement in motor fuel dispensing.

(Item 107 was adopted)

108 THE COMPUTATION AND POSTING OF PRICES OF MOTOR FUELS
SOLD BY THE GALLON OR THE LITER AT RETAIL OUTLETS

At the 64th annual meeting in July 1979 in Portland, Oregon, the National Conference on Weights and Measures adopted a policy which recommended that each State and local jurisdiction implement a uniform three-phase plan and timetable for the sale of motor fuels by the gallon or liter. The policy provided a solution to the problem of price computation by retail motor-fuel devices that did not have the capability to compute on the basis of unit prices in excess of \$0.999.

The policy recognized the urgent need to allow "half-pricing" as an expedient, short-term method of sale. However, since metric conversion of retail motor-fuel devices was recognized by authorities in both government and industry as being economically feasible and cost-beneficial to the nation overall, the NCWM policy recommended conversion to liter pricing for the long term.

During the past year, significant progress has been made in many areas throughout the United States on the voluntary conversion to the metric system of measurement in the sale of gasoline. Most State and local jurisdictions have established requirements based upon NCWM recommendations for the elimination of half-pricing, or other interim measures, and have set timetables for either whole gallon or liter measurement and price computation.

The several methods of sale and advertising practices that exist today have led to confusion and to a lack of uniformity of requirements among the States. There is a need to establish additional recommendations to guide State and local jurisdictions and the petroleum industry for the computation and posting (advertising) of prices of motor fuels sold at retail.

The sale and purchase of motor fuel by the liter will be one of the first major exposures consumers will have to metric measurement in the marketplace. How well consumers accept the conversion program will depend on their understanding of the change and the information that is made available to them that enables value comparisons among alternative products, comparison of miles per liter with miles per gallon, and comparison of prices per liter and per gallon.

The Conference had an opportunity to review a discussion paper that recommended guidelines pertaining to the computation and posting of prices of motor fuels and which included information on:

- 1) Street signs
- 2) Posting of prices at the dispenser
- 3) Metric equivalent values and conversion factors
- 4) Conversion tables
- 5) Quantity and price display on dispensers
- 6) Dispenser Modification kits

The guidelines were discussed during the hearing by the Committee on Specifications and Tolerances (S & T). The S & T Committee recommended to this committee that due to the short time available for adequate review and development of a Conference position on the recommended guidelines, the paper be held over for further consideration by all interested parties in the months ahead and be placed on the P & C Committee's agenda for the interim meetings in January 1981. The S & T Committee further recommended that OWM/NBS give consideration to distributing appropriate guidelines on this subject based on the comments and suggestions that were made during the Conference, and for the purpose of receiving input for study and use during the interim meetings. The P & C Committee agrees with the recommendations of the Committee on Specifications and Tolerances and will plan to carry this item on its agenda for 1980-81.

The committee also wishes to gratefully acknowledge the letter it received from Mrs. Esther Peterson, Special Assistant to the President for Consumer Affairs, who expressed great concern with the growing consumer confusion regarding the posting of prices at retail motor-fuel

outlets. She called upon the NCWM to give priority consideration to the formulation and adoption of guidelines for a uniform method of advertising and posting of prices. She stressed that any guidelines adopted should reflect the recommendations set forth in the position paper Factoring The Consumer Into Motor Fuel Dispenser Conversion Programs prepared by the Consumer Liaison Committee of the American National Metric Council and endorsed by the Council on March 26, 1980. There was extensive consumer input into those recommendations, and she indicated her high regard for them to the American National Metric Council.

(A motion to amend was made and adopted to refer this subject matter to the Committee on Laws and Regulations for future consideration. Item 108 was adopted as amended.)

- C. H. Vincent, Dallas, Texas, Chairman, NCWM
- D. I. Offner, St. Louis, Missouri, Chairman, L & R Committee
- D. A. Guensler, California, Chairman, S & T Committee
- S. J. Darsey, Florida, Interim Chairman, Education Committee
- C. H. Greene, New Mexico, Chairman, Liaison Committee
- H. F. Wollin, NBS, Executive Secretary, NCWM

COMMITTEE ON NATIONAL MEASUREMENT
POLICY AND COORDINATION

(On motion of the committee chairman, the report of the Committee on National Measurement Policy and Coordination voting key items 100 through 108 was adopted in its entirety by the Conference. The results of the voting in the House of State Representatives and the House of Delegates under the Conference voting system are totalized in the table that follows. The Conference also authorized the executive secretary to make any appropriate editorial changes in the language adopted by the Conference, provided that the requirements thus adopted are strictly adhered to.)

VOTING RESULTS-Committee on National Measurement Policy
and Coordination

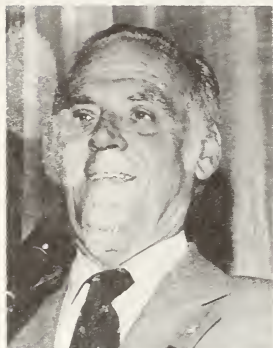
Voting Key	House of State Representatives		House of Delegates	
	Yes	No	Yes	No
100	41	0	58	0
101	41	0	48	0
102	41	0	52	0
103	40	0	54	1
104	41	0	55	0
105	42	0	47	0
106	42	0	55	0
107	39	2	53	1
108A	32	8	52	6
108	40	2	54	1

A=Amendment

REPORT OF THE COMMITTEE ON LAWS AND REGULATIONS

Presented by DANIEL I. OFFNER, Commissioner,
Officer of Weights and Measures, Department of
Public Safety, St. Louis, Missouri

(Thursday, June 26, 1980)



VOTING KEY

200

INTRODUCTION

The Committee on Laws and Regulations submits its report to the 65th National Conference on Weights and Measures. The report consists of the tentative report as offered in the Conference Announcement and as amended by this final report.

The report represents recommendations of the committee that have been formed on the basis of written and oral comments received during the year and oral presentations made during the open meeting of the committee. Unless otherwise specified, all recommended amendments are to appropriate provisions of the Model Laws and Regulations as compiled in NBS Handbook 130, 1979 Edition.

201 MODEL STATE WEIGHTS AND MEASURES LAW

201-1 ADOPTION BY CITATION

Adoption by citation has been a feature of the process by which Handbook 44 has achieved wide acceptance. The Committee is of the view that a similar mechanism should be available for other models developed by the Conference. With the development of Handbook 130, it is now possible to provide a similar mechanism. Accordingly, the Committee recommends the addition of the following Section to the Model State Weights and Measures Law and the renumbering of subsequent sections:

Section 5. Technical Requirements for Commodities

The methods of test, inspection procedures, moisture determinations, measurement system changes, units, terms and other requirements for the packaging, labeling, method of sale, unit pricing, and open dating of commodities, as adopted by the National Conference on Weights

and Measures and published in the National Bureau of Standards Handbook 130, and supplements thereto or revisions thereof, shall apply to all commodities kept, offered, or exposed for sale in this State except insofar as specifically modified, amended, or rejected by regulation.

(Motion to table item 201 passed. Following adoption of report, motion to remove this item from table for consideration next year was passed.)

202 MODEL STATE PACKAGING AND LABELING REGULATION

The Committee has been made aware of the need to correct some oversights and modify some sections of the Model State Packaging and Labeling Regulation, particularly as they relate to metric labeling. The corrections and modifications are necessary to bring the Model into harmony with appropriate Federal statutes (Fair Packaging and Labeling Act and Metric Conversion Act of 1975). Accordingly, the Committee recommends the following amendments:

202-1 SECTION 6. DECLARATION OF QUANTITY: CONSUMER PACKAGES

Section 6.6.1. Symbols - Include the lower case "l" as an acceptable symbol.

Section 6.6.1.(b) - Reword as follows:

(b) The "l" symbol for liter and "ml" symbol for milliliter are permitted; however, the "L" symbol and the "mL" symbol are preferred.

Section 6.8.1. Proviso - Change two to three in the number of decimal places for random package labels in the metric system.

(Items 202 and 202-1 were adopted.)

202-2 SECTION 11. EXEMPTIONS

In providing for conversion to the metric system through the Model Regulation, certain labeling exemptions were granted to commodities packaged in specified metric quantities. Under the terms of the Fair Packaging and Labeling Act, such exemptions would first have to be adopted by the cognizant Federal agencies before they would have any force or effect. Accordingly, the

Committee recommends deleting the exemptions and metric references from--

Section 11.13 Butter
Section 11.15 Flour
Section 11.16 Small Packages
Section 11.17 Decorative Containers
Section 11.19 Margarine
Section 11.20 Corn Flour and Corn Meal.

Also the Committee recommends deleting the term "round metric size" from--

Section 11.23 Paints and Kindred Products
Section 11.25 Motor Oils.

(Item 202-2 was adopted.)

202-3 SECTION 12. VARIATION TO BE ALLOWED

The existing language in Section 12.2 limits the magnitude of permitted variations to those contained in NBS Handbook 67 and the Model State Method of Sale of Commodities Regulation. The Committee notes that package quantity variations are not contained in the Model State Method of Sale of Commodities Regulation, and that Section 10.9.3. of the Model State Packaging and Labeling Regulation does contain provisions for package quantity variations for textiles. The net effect of the existing language is to deny in Section 12.2. what is provided for in Section 10.9.3., and to refer to non-existent provisions in another Conference Model Regulation. Accordingly, the Committee recommends the following:

12.2. Magnitude of Permitted Variations

The magnitude of variations permitted under Sections 12, 12.1., 12.1.1., and 12.1.2., of this regulation, shall be those expressly set forth in this regulation and those contained in the procedures and tables of National Bureau of Standards Handbook 67, Checking Prepackaged Commodities.

(Item 202-3 was adopted.)

203 MODEL STATE UNIT PRICING REGULATION

The committee is of the view that metrication of the Model State Unit Pricing Regulation would be premature until such time as preferred sizes in the metric system

for the various commodities are developed. Accordingly, the Committee proposes to keep this item on its agenda and report developments as necessary.

(Item 203 was adopted.)

204 MODEL STATE METHOD OF SALE REGULATION

The Committee has reviewed the following three sections of the Model State Method of Sale of Commodities Regulation and, to clarify the intent, recommends they be amended as follows:

204-1 SECTION 1.2. BREAD - Remove the phrase "within reasonable variations or tolerances."

The removal of the phrase will make Section 1.2. consistent with all other provisions in the regulation and restrict the requirements to methods of sale which is the original intent.

(Items 204 and 204-1 were adopted.)

204-2 SECTION 1.11. MEAT - Reword as follows:

Section 1.11. Sale of Meat by Carcass, Side or Primal Cut - At the time of delivery of bulk meat to the purchaser, the seller shall provide a written statement giving the following information:

- (a) The name and address of the seller (firm).
- (b) The date of the sale.
- (c) The name and address of the purchaser.
- (d) The identity in the most descriptive terms commercially practicable.
- (e) The quality grade and yield grade, if so represented.
- (f) The price per pound before cutting and wrapping and the total price of the sale.
- (g) The total net weight (hanging weight) of the carcass, side, or primal cut prior to cutting or processing.
- (h) The total net weight of the cut and processed meat delivered to the purchaser.

- (i) A list by name of all cuts delivered.
- (j) An itemized list of any and all charges over and above the original sale price of the carcass, side, or primal cut.
- (k) A separate indication of the quantity of any meat or other commodity(s) received by the purchaser as an inducement in connection with the purchase of the carcass, side, or primal cut.

The rewording of Section 1.11. provides for an identity requirement that is currently lacking; provides for grade identification of the total item rather than the individual cuts as now required; and provides that inducements offered as a part of the sale be listed separately on the sales or delivery ticket rather than omitted as now required.

(Item 204-2 was adopted.)

204-3 SECTION 2.12. POLYETHYLENE PRODUCTS - Reword the headings as follows:

"Consumer products offered and exposed for sale at retail shall be sold in terms of:

"Products not intended for the retail consumer shall be offered and exposed for sale in terms of:".

Delete the last paragraph concerning average thickness, sampling procedures, and label declarations.

It is the Committee's view that the wording of Section 2.12. should be restricted to method of sale, and extraneous items, such as labeling and sampling requirements, are adequately covered elsewhere and only create confusion by their inclusion in this Section.

(Item 204-3 was adopted.)

204-4 The Committee recommends deletion of the following sections:

Section 3.2.2. Cups: Paper and Plastic

Section 3.2.3. Paper Plates

Section 3.2.4. Sanitary Paper Products.

These sections provide for tolerances on certain commodities. The tolerances apply to products covered by the Fair Packaging and Labeling Act, which preempts State and local requirements that are less stringent than the requirements adopted by the Federal Trade Commission under that Act. The FTC has made its views known to the Committee. It is the view of the FTC staff that there is an absence of any information indicating that such products cannot consistently meet the labeled quantity on the average as currently required by the FTC's regulations implementing the Fair Packaging and Labeling Act. The Committee is persuaded by this view and, therefore, recommends deletion of the three sections and appropriate renumbering of the Regulation.

The Committee recommends the addition of the following sentence at the end of each section:

"The Committee recommends the withdrawal take place July 1, 1981."

(Motion to amend the report by deleting the committee's last recommendation setting a withdrawal date passed. Item 204-4 as amended was adopted.)

The Committee recommends the addition of the following two sections:

204-5 SECTION XX TEMPERATURE COMPENSATION

Home heating oils shall be sold by the gallon, temperature compensated to 60 °F, or by the liter, temperature compensated to 15 °C.

In considering this matter, the committee reviewed all prior Conference action with respect to requirements for the sale of home heating oils and noted that the Conference had recommended their sale on a temperature compensated basis more than 25 years ago. It was also noted that the Conference had acted with respect to the sale of packaged goods, including petroleum products, by requiring the volume to be expressed at specified temperatures. The Conference also adopted device codes (Handbook 44) dealing with devices that measured specific products--liquefied petroleum gas and cryogenic fluids--and with devices that were not product specific--wholesale liquid measuring devices--which incorporated requirements for those situations where the user chose to employ an automatic temperature compensator.

In short, the Conference recognized, approved, and required that products be sold on a temperature compensated basis. For this reason, the Committee offers the addition of the requirement.

(Motion to table was defeated. Item 204-5 as proposed was also defeated.)

204-6 SECTION XX LIQUEFIED PETROLEUM GAS CYLINDER TARE WEIGHTS -

Whenever stamped tare weights on cylinders are employed in the sale of liquefied petroleum gas, the following shall apply.

Section XX.1. All newly stamped tare weights shall be accurately represented to the nearest 0.25 pound.

Section XX.2. The allowable difference between actual tare weight and stamped tare weight on cylinders in use shall be 0.25 pound.

Evidence supplied to the Committee indicates a need for some action by weights and measures in the matter of cylinder tare weights. The data supplied show the problem of incorrect tare weights extends to both new cylinders and those in use. The Committee recommends holding over this item for one year to determine any possible conflicts with U.S. Department of Transportation requirements.

(Item 204-6 was adopted.)

204-7 SOFTWOOD LUMBER

The committee has not received any comments concerning proposed changes to this section of the Model. Accordingly, the committee proposes to delete this item from its agenda.

(Item 204-7 was adopted.)

204-8 WALL COVERINGS

The committee has received extensive input from producers, retailers, and users of wall coverings concerning the need for a standard size for the product. It is the committee's conclusion that any possible difficulties in determining the amount of wall covering to purchase cannot be resolved by the adoption of a standard size roll. Design considerations and room configurations are such that the applicable method of sale for wall coverings

must be on a square footage basis. The committee urges weights and measures jurisdictions to make certain that packaged wall coverings are fully labeled with the required quantity elements, and that point-of-sale quantity information, provided to the consumer when products are being ordered, is full and complete. The Committee has requested that the Wallcovering Manufacturers Association seek to develop a standard format for the presentation of quantity information in sample books and other point-of-sale references and instructions.

(Item 204-8 was adopted.)

204-9 PRODUCE

The Committee proposes adoption of the guideline entitled "Method of Retail Sale for Fresh Fruits and Vegetables" as it appeared in the Committee's Tentative Report to the 64th National Conference with one proviso. The Committee recognizes the difficulty faced by consumers when more than one method of sale is employed in the same outlet for the same product. The Committee urges that non-comparable methods of sale (e.g. weight and measure) for the same produce item in the same outlet be minimized.

(Item 204-9 was adopted.)

205 OTHER ITEMS

205-1 FIELD VERIFICATION OF WEIGHING DEVICES

The Committee has received significant input on the proposal for a Model State Program for the Field Verification of Weighing Devices from weights and measures jurisdictions and associations. On the basis of these comments, the Committee feels it would be inappropriate to proceed with the proposal for several reasons:

- 1) The proposal is limited in that it only deals with weighing devices;
- 2) The proposal makes no provisions for other methods now employed by various jurisdictions such as witness of test arrangements, variable frequency of test programs, and the like;
- 3) It is not clear that the proposal has received sufficient exposure to all parties concerned including device owners, independent service companies, the general public, etc.

The Committee recognizes the value of the concept of greater utilization of private sector capability in testing programs. It notes that private sector capability has been extensively employed in many jurisdictions in such areas as livestock and railway track scale testing efforts.

For these reasons, the Committee will continue to explore this matter and begin an extensive review of the Model State Regulation for the Voluntary Registration of Servicepersons and Service Agencies for Commercial Weighing and Measuring Devices.

(Item 205-1 was adopted.)

205-2 STANDARD BARREL ACT

The National Bureau of Standards has requested that the Conference express its views on the repeal of the Standard Barrel Acts. These Acts were originally passed in 1915 and 1916 and provided for standard barrels for fruits, vegetables, and other commodities. To the best of our knowledge, standard barrels are no longer used for such purposes. Therefore, the Committee recommends the repeal of the Federal Standard Barrel Acts.

(Item 205-2 was adopted.)

205-3 BEER AND WINE PACKAGING AND LABELING

The Committee wishes to acknowledge receipt of communications concerning beer and wine packaging and labeling from the State of California, California Brewers Association, and the Wine Institute. The Committee proposes to place this item on its agenda and would welcome comments on the matter from all interested parties.

(Item 205-3 was adopted.)

D. I. Offner, St. Louis, Missouri, Chairman
J. J. Bartfai, New York
S. F. Hindsman, Arkansas
W. R. Mossberg, Los Angeles County, California
R. W. Probst, Wisconsin
E. A. Vadelund, Staff Assistant, NBS
H. F. Wollin, Executive Secretary, NCWM

COMMITTEE ON LAWS AND REGULATIONS

(On motion by the committee chairman, the report of the Committee on Laws and Regulations voting key items 200 through 205-3 was adopted in its entirety as amended by the Conference. The results of the voting in the House of State Representatives and the House of Delegates under the Conference voting system are totalized in the table that follows. The Conference also authorized the Executive Secretary to make any appropriate editorial changes in the language adopted by the Conference, provided that the requirements thus adopted are strictly adhered to.)

VOTING RESULTS--Committee on Laws and Regulations

Voting Key	House of Representatives		House of Delegates	
	Yes	No	Yes	No
200	41	0	57	0
201T	38	2	36	7
202	42	0	56	0
202-1 }				
202-2 }				
202-3 }	41	0	56	0
203	40	1	56	0
204	41	0	56	0
204-1 }				
204-2 }				
204-3 }	31	6	24*	10
204-4A				
204-4				
204-5T	9	22*	13	42
204-5	8	29	9	48
204-6	41	0	53	0
204-7	40	0	53	1
204-8	34	4	52	5
204-9	38	3	54	3
205	42	0	53	0
205-1 }				
205-2 }				
205-3	37	2	52	0

T = Table

A = Amendment

* = Failed Minimum Vote Requirement

REPORT OF THE COMMITTEE ON SPECIFICATIONS AND TOLERANCES

Presented by DARRELL A. GUENSLER, Assistant Chief, Division
of Measurement Standards, State of California

(Thursday, June 26, 1980)



VOTING KEY

300

INTRODUCTION

The Committee on Specifications and Tolerances submits its report to the 65th National Conference on Weights and Measures. The report consists of the tentative report as offered in the Conference Announcement and as amended by this final report. The report represents recommendations of the committee that have been formed on the basis of written and oral comments received during the year and oral presentations made during the open meeting of the committee. All recommended amendments are to appropriate provisions of the codes of the National Bureau of Standards Handbook 44, 1979 Edition, "Specifications, Tolerances, and Other Technical Requirements for Commercial Weighing and Measuring Devices."

NOTE: Except where paragraphs are to be added or completely revised as indicated, changes are shown as follows: that which is to be deleted is shown lined out, and that which is to be added is underlined.

301

CODE FOR SCALES (2.20.)

301-1 S.1.1. ZERO INDICATION.

In the committee's report to the 64th National Conference on Weights and Measures (NCWM) there were several references to this paragraph as it applied to electronic digital indicators. The committee reviewed the comments made on the items during that Conference and the comments received since that time. The committee reconfirms its views for the most part as expressed in that report, and offers the following comments and summary.

In order for the display of a zero balance condition on an electronic digital indicator to meet the requirements of this paragraph and paragraph G-S.5.1. Indicating and

Recording Elements/General, a zero balance condition can be indicated only by a display of zeroes without a display of either a minus or a plus sign. Further, the minimum number of zeroes required to be displayed is all of the decades to the right of a decimal point in the display and at least one active decade to the left. For example, a 25 lb x 0.01 lb scale would require at least 0.00; a 100 000 lb x 20 lb scale would require at least 00 since the last decade is a constant zero.

A negative balance condition can be displayed in any of the following ways consistent with the specific application.

- (a) Blanking the display. If this method is used, the following applies. If the device also blanks to indicate over capacity and the load condition of the load receiving element is not evident to the operator, this method cannot be used. For example, on a hopper scale where the operator does not have available a clear indication as to whether or not there is any product in the hopper, the indicating element cannot use the same means to indicate an over capacity condition and a negative balance condition.
- (b) A display of a symbol or a series of symbols which cannot be interpreted as quantity values, e.g., -, or - - - -, or E, or EEE, or Err, or Error, or E S-1, or E S-2, etc. A display of a minus sign with a zero or zeroes is not considered appropriate, e.g., -00, or -000. In last year's report, the committee had indicated that a display of complements (9999) was an appropriate display of a negative balance condition providing that the value displayed exceeds scale capacity. It is the committee's view that this technology is appropriate for limited applications where the display of complements is not confusing.
- (c) When a device is equipped with a tare capability, a negative no load balance condition may be indicated in any of the previous ways; however, a tare value must be displayed as a negative value in the net mode.

On indicators equipped with an auxiliary or supplemental "center of zero" indicator, this indicator must define a zero balance condition to $\pm 1/4$ of a scale division or better. The committee is considering recommending this feature as mandatory in the near future.

Until that time, the committee recommends Paragraph S.1.1. Zero Indication be amended by adding the following sentence at the end of the paragraph:

On a digital indicator equipped with an auxiliary or supplemental "center of zero" indicator, this indicator shall define a zero balance condition to $\pm 1/4$ of a scale division or better.

(A motion to amend by deleting the interpretations included in this item was defeated following considerable discussion. Item 301-1 was adopted.)

301-2 S.2. DESIGN OF BALANCE, TARE, LEVEL, DAMPING, AND ARRESTING MECHANISMS.

The committee reviewed its comments and recommendations on this section in last years' report and the discussion, comments, and suggestions it received during and since that time. On that basis, the committee recommends the code be amended as follows:

Add these new definitions at the end of Code 2.20 (pages 2-25 to 2-30)

zero setting mechanism. Means provided to attain a zero balance indication with no load on the load receiving element.

manual zero setting mechanism. Nonautomatic means provided to attain a zero balance indication by the direct operation of a control.

semi-automatic zero setting mechanism. Automatic means provided to attain a direct zero balance indication requiring a single initiation by an operator.

automatic zero setting mechanism. Automatic means provided to maintain a zero balance indication without the intervention of an operator.

Amend S.2.1.2. to read:

S.2.1.2. ON SCALES USED IN DIRECT SALES.--A manual zero setting mechanism shall be operable or accessible only by a tool outside of and entirely separate from this mechanism or enclosed in a cabinet. A balance ball shall either meet this requirement or shall not itself be rotatable.

A semi-automatic zero setting mechanism shall be operable or accessible only by a tool outside of and entirely separate from this mechanism or enclosed in a cabinet, or shall be operable only when the indication is stable within:

(a) *plus or minus one scale division (d_d) for all scales other than axle load, railway track, and vehicle scales,*

(b) *plus or minus three scale divisions (d_d) for axle load, railway track, and vehicle scales,*

(Subsection (a) is nonretroactive and enforceable as of January 1, 1977, for scales of more than 5000 lb capacity; retroactive as of January 1, 1981 for scales of 5000 lb capacity or less.)

[Amended 1980]

Amend S.2.1.3. to read:

S.2.1.3. ON SCALES EQUIPPED WITH AN AUTOMATIC ZERO SETTING MECHANISM.

Under normal operating conditions, the maximum load that can be "rezeroed" when all at once placed on or removed from the platform shall be:

(a) *For bench, counter, and livestock scales - 0.6 scale division,*

(b) *For axle load, railway track, and vehicle scales - 3.0 scale divisions,*

(c) *For all other scales - 1.0 scale division.*

(Nonretroactive and enforceable as of January 1, 1976)
[Amended 1980]

The committee offers the following interpretations with respect to this technology.

Under Paragraph (a) AZSM may be operable with the device at a gross zero, a net zero, or a negative indication as a result of tare.

Under Paragraphs (b) and (c) the AZSM can be operable at a gross zero only. The reason that these devices should

operate only at a gross zero is that a slow loading or unloading operation may bring about the tracking of a quantity that was intended to be a part of the weight. It is further the committee's view that AZSM should not be operable on any hopper scale. It is the committee's intent to include these restrictions in recommended code amendments next year.

Revise S.2.4.1. to read:

S.2.4.1. ELECTRONIC ELEMENTS. - Electronic indicating elements equipped with recording elements shall be equipped with effective means to permit the recording of weight values only when the indication is stable within:

(a) *plus or minus one scale division (d_d) for all scales other than axle load, railway track, livestock, and vehicle scales,*

(b) *plus or minus three scale divisions (d_d) for axle load, railway track, livestock, and vehicle scales.*

The values recorded shall be within applicable tolerances. *(Subsection a) is nonretroactive and enforceable as of January 1, 1977, for scales of more than 5000 lb capacity; retroactive as of January 1, 1981, for scales of 5000 lb capacity or less.)* [Added 1975, Amended 1980]

(Item 301-2 was adopted.)

301-3 TARE

In response to a request for the committee's views on tare design and application, the committee offers the following: There are many considerations with respect to devices equipped with a tare capability. The primary consideration is whether or not a tare capability is necessary for a given weighing application. A device equipped with a tare capability in an installation where there is absolutely no need for tare can facilitate manipulation by the operator. Another consideration is whether the device is used for direct sales or for indirect sales only; or whether the device is used for buying, selling, batching, or any combination of these. A key factor is the requirements of G-S.2. Facilitation of Fraud and G-S.5.1. which requires the indications to be clear, definite, accurate, and easily read by all parties involved in the weighing operation.

Means for taking tare can be defined or described as follows:

- o Graduated or ungraduated tare poises on a tare beam or bar.
- o Thumbwheel Tare - The dialing in of tare values by means of thumbwheels or knobs.
- o Keyboard Tare - The operation of keys on a keyboard; e.g., with a typical 10 key keyboard with values 0 through 9, by the pushing of a key numbered 5, the number 5 is entered as a tare value.
- o Digital Tare - By the repeated operation of a particular key, tare values are entered in amounts equal to the value of a scale division. For example, on a 25 pound x 0.01 pound scale, each time a key marked T_2 is depressed, a tare is entered equal to 0.01 pound. If that key were depressed five times, the tare value would be equal to 0.05 pound.
- o Push Button Tare - With a load on the platform, the operation or depressing of the tare key enters a tare value equal to the weight of that load. For example, if an empty container is placed on a computing scale or any empty truck is driven on a vehicle scale, the weight display will be equal to the weight of the container or truck. Then by depressing the tare key, the weight display will be "zero." With the removal of the tare load, the weight display will be a negative value equal to the weight of the tare material.

There are many considerations with respect to each of these technologies. The committee has attempted to sum them up as follows:

- o A device equipped with any type of tare capability must indicate the tare value identified as tare in some clear manner, e.g. with a "minus sign" or a display of the word "tare."
- o An indication must be provided to clearly show that a tare has been entered, except on electronic cash registers.
- o If the possibility exists that a tare value can be cleared when a load is on the platform, a clear indication that the tare has been eliminated must be provided.
- o Push button tare should not be operable when the scale is in "motion" or an equilibrium has not been attained.

- c Digital and keyboard tare should be operable only with no load on the platform, unless the tare value can be displayed.
- d The value of a tare division may be less than the value of the scale division provided the following conditions are met: (a) the number of tare divisions does not exceed 99 000, and (b) the value of the tare division is either equal to 1/2 or 1/3 the value of the scale division, except in the case of a monorail scale (see Paragraph 3.1.1.4.), and (c) when the tare value is entered and displayed in values less than the value of the scale division, the tare value has integrity and the net quantity is presented in scale divisions, and (d) when the tare values can be entered in values less than the value of the scale division, but is displayed in scale division values, the entered value should round off to a scale division value. In some devices now being used, the entered values round down to scale division values; however, the committee feels this design should no longer be considered appropriate.

(Item 301-3 was adopted.)

301-4 TOLERANCES

At its interim meeting, the committee received a report from the Scale Manufacturers' Association, Tolerance Subcommittee. The highlights of this report are:

- (a) Factors leading to the Need for a Review of Tolerance Structure--The advancement of technology, particularly in the fields of data processing and electronics and with the generation of new scale codes nationally and internationally--a genuine need exists to harmonize these codes for reasonable uniformity.
- (b) Statement of Work--The construction of a simplified tolerance structure for commercial weighing equipment incorporating the views of concerned and interested parties and, Scope--The simplified tolerance structure shall apply (within the technical resources available) to all scale types covered in the Scale Code of NBS Handbook 44.
- (c) Summary of Draft Proposal--Tolerance requirements are independent of principle of operation; tolerances are based on a step-type error function, wherein the tolerance is expressed in terms of divisions; tolerance

applies for both increasing and decreasing loads and within specified normal limits of environment-temperature, etc.; tolerance regulation includes zero and tare set tolerance; tolerance regulation covers multiple representations; tolerance regulation includes repeatability and shift test tolerances; tolerance regulation includes discrimination/sensitivity tolerances; tolerance regulation specifically includes provisions for out-of-level and other environmental conditions including temperature/barometric effect on zero, warm-up, electrical power, previous loading history, in-motion, and time differences; tolerance regulation generally includes provisions for effects of vibration, wind, snow and rain, washdown, gravitational effects, shock and side loads, temperature gradients, radiation effects, and EMI/RFI.

The committee wishes to express its appreciation to the SMA Subcommittee for its excellent efforts to this date, especially in attaining a consensus within the SMA membership on the principles expressed in its report. The committee looks forward to its representation and the representation of other interested parties with the subcommittee in the development of a final recommendation for review and action by the 66th NCWM in 1981.

The committee recommended that a report of this subcommittee be made during the 65th NCWM in 1980, and possibly during a session at which OIML representatives will be in attendance. A report was presented during the open meeting by the subcommittee chairman, Mr. John J. Elengo, Jr., Vice President, Engineering, Revere Corporation of America.

With respect to the suggestion received for the presentation in Handbook 44 of tolerance tables applicable to specific devices, which include basic, minimum, shift test, increasing and decreasing load test tolerance values, the committee feels this is appropriate but a bit premature. When a revision of the tolerances is adopted by the Conference, the committee may propose appropriate tables if deemed necessary for ease of field officials in determining tolerance values. In the meantime, the committee encourages any individual jurisdiction to develop tables it deems necessary for its own staff.

(Item 301-4 was adopted.)

301-5 UR.3.2. MINIMUM LOAD ON VEHICLE SCALE.

The committee received recommendations from three regional associations and the Scale Manufacturers Association on this

paragraph. One association indicated it wanted a specific recommendation from the committee, the other two wanted the word "net" to be included in the paragraph. It is the view of the committee that the report and discussions of the last three National Conferences provide adequate background information on this item and, consistent with the views expressed repeatedly by the committee, recommends this paragraph be amended to read:

UR.3.2. MINIMUM LOAD ON VEHICLE SCALE.--A vehicle scale shall not be used for weighing a net load ~~smaller than 1-000-pounds.~~ less than a quantity equal to 50 scale divisions.

(After a lengthy discussion, Item 301-5 was defeated.)

301-6 COUNTING SCALES

The committee discussed these devices and the need for additional requirements directed to this technology. Sufficient time was not available to develop final criteria for action by this Conference. The committee recommends to those jurisdictions where counting scales are examined, that a judicious application of the existing requirements of the General Code and the Scale Code are sufficient for adequate control. The committee generally felt that counting scales should have the capability of indicating weight values, and that a minimum capacity should be considered to minimize the uncertainty in the sample weight determinations. The committee will report on any specific recommendations it receives for additional requirements over the ensuing year.

(Item 301-6 was adopted.)

301-7 OTHER CONSIDERATIONS

The committee reviewed all of the comments, and recommendations made in its tentative report of last year under Item 302-16 "Interpretations and Other Problems Solving." Some of that material has already been referenced in this report, other portions will be dealt with in the future.

A prototype examination check list for electronic indicators that includes most of the interpretations in 302-16 has been developed and is available from OWM on request.

With respect to interpretations of code requirements when a disagreement between interested parties develops, the committee is the appropriate party to resolve any of these issues. For an interpretation or a guide to any

technical problem, write or call the Committee on Specifications and Tolerances, c/o the National Conference on Weights and Measures, National Bureau of Standards, Washington, D.C. 20234, (301) 921-2401.

(Item 301-7 was adopted.)

302 CODE FOR BELT-CONVEYOR SCALES (2.21)

At the interim meeting, a special time was set for a discussion on this code. Many representatives of belt conveyor scale manufacturers and users were present. The committee had also received several communications on this code. A lengthy discussion ensued on tolerances, installation requirements, test procedures and other aspects of belt conveyor scales and their use.

A consensus did develop that although a tolerance reduction may be desirable, a tolerance reduction was not feasible because of the uncertainties in the test standards used and in the testing process. Further discussion also resulted in the development of a consensus on a number of other considerations. These results are reflected in the following recommendations of the committee.

Add new paragraph T.3. to read:

T.3 TOLERANCE VALUES-SIMULATED TESTS-REPEATABILITY TESTS. The variation in the values obtained during the conduct of simulated tests shall not be greater than plus or minus 0.125% (1 part in 800) of the value obtained on the first acceptable simulated test.

Amend Paragraph UR.2.2. CONVEYOR INSTALLATION as follows:

Strike the last four words of the first paragraph . .
~~to-assure-satisfactory-performance-~~

Amend subparagraph b) as follows:

(b) The scale shall be installed at least 20 feet or 5 idler spaces, whichever is greater, from loading point, skirting, ~~training-idlers~~, head or tail pulley, or convex curve in the conveyor, and at least 40 feet from any training idler.

Amend subparagraph (e) as follows:

(e) The conveyor shall be no longer than ~~2000~~ 1000 feet from head pulley to tail pulley.

Add a new subparagraph (i) as follows:

(i) A conveyor scale shall be so installed that neither its performance or operation will be adversely affected by any characteristic of the foundation, supports, or any other equipment.

Add a new subparagraph (j) as follows:

(j) The scale area and 3 idlers on both ends of the scale shall be of a contrasting color, or other suitable means shall be used to distinguish the scale from the remainder of the conveyor installation, and the scale shall be readily accessible on both sides of the conveyor.

Reletter existing subparagraph (i) to (k).

Amend Paragraph UR.2. Installation Requirements. by adding the following new non-retroactive paragraph.

UR.2.3. MATERIAL TEST. - *A belt conveyor scale shall be installed so that a material test can be conveniently conducted. (Nonretroactive as of January 1, 1981).*

Amend note paragraph N.1. General. fourth sentence as follows:

~~Whenever-feasible,~~ The first test of the device should be a Material Test in accordance with N.3.2. and the correlation with the Simulated Test (N.3.3.) suitable for the device should be ~~verified~~ established at this time.

(Item 302 was adopted.)

303 CODE FOR LIQUID-MEASURING DEVICES (3.30)

303-1 S.1.4.4. FOR RETAIL DEVICES ONLY, EXCEPT SLOW-FLOW METERS/MONEY-VALUE COMPUTATIONS.

The committee received a comment on this paragraph and heard several others at the interim meeting. One of these issues was directed to that part of this paragraph that allowed the maximum total sales value to be computed and displayed to either the capacity of the quantity indications or the capacity of the total sales indication, whichever is less.

In the delivery of product to a receiving vehicle by some existing equipment the display of the total quantity delivered is correct, but when this quantity is multiplied

by the unit price, the computer does not have the capacity to indicate the total sales value. A specific example of this condition is that device most commonly referred to as "the three wheel computer."

It is the view of the committee that the ideal situation is to require that a computing type device have the capability of indicating a maximum total sales value that can be computed when multiplying the maximum quantity that can be indicated (sufficiently large enough for most sales) by the maximum unit price for which the device is designed to compute. This is a multi-faceted problem since all of the following must be considered:

analog - digital, mechanical - electronic, gallons - liters, trucks - automobiles, existing - future, etc.

For example, if a computer was designed as follows:

Total Sale	\$XXX.XX	(\$999.99)
Unit Price	\$ X.XXX	(\$ 9.999/gallon)
Quantity	XX.XXX	(99.999 gallon)

this design might not be considered appropriate for truck stops since the maximum gallonage displayed is only 99.999 gallons, and many trucks have fuel tanks larger than 100 gallons.

This design when converted to metric becomes:

Total Sale	\$XXX.XX	(\$999.99)
Unit Price	\$ X.XXX	(\$ 9.999/liter)
Quantity	XXX.XX	(999.99 liter)

This design might then not be considered appropriate since when multiplying the maximum quantity by the maximum unit price, the result is a greater money value than can be displayed. However, this design provides an equivalent maximum unit price of almost \$38 per gallon, a maximum quantity indication of almost 265 gallons and a maximum total sales value of almost \$1,000.00. This design will present a mathematical agreement problem when the unit price exceeds \$1.00 per liter. It is the view of the committee that quantity indications in liters should not be smaller than 0.01 liter and that the mathematical agreement problem can be resolved before unit prices exceed \$1.00 per liter and total price intervals exceed 1 cent. These examples converted to a mechanical design pose a different set of problems. This discussion and examples, are only to illustrate that there is no simple solution to this issue and perhaps not a single solution at all.

It might seem that the most practical solution would be to require the device to automatically stop any delivery whenever the capacity of any indication is reached. The committee requests that manufacturers consider this as a most practical solution and requests their comments during the ensuing year.

Another problem in need of an equitable and cost effective solution is the design of electronic consoles that interface with retail petroleum dispensers in prepay or postpay systems. The present design of most systems "pulse" the total sales value from the retail petroleum dispenser and send only that information to the console. The unit prices are manually input to the console and the total quantity is determined in the console by dividing the total sales value by the unit price. Consequently, the total quantity at the console may differ by a small amount from the total quantity value at the dispenser because of the rounding off of total money values. When the dispenser is analog the total difference is always less the one-half graduation; consequently, the digital quantity value in the console is always a value rounded to the closest analog graduation. If the dispenser is digital, the difference between the dispenser and the console is never greater than 1/2 cent worth of product, and as the price increases the difference between the values decreases. This design has been considered correct but difficulty arises when the console is used with a pre-set stop for quantity. Since, the quantity value in the console is determined by dividing the total money value by the unit price, the requested gallonage amount displayed at the dispenser may be less than the quantity requested. For example, if the quantity requested was 5 gallons and the unit price was \$1.198 the console then determines the stopping point as follows: 5 gallons x \$1.198 = \$5.99. However, at that unit price \$5.99 is the total sales value for all quantities from 4.996 gallons to 5.004 gallons.

Therefore, the delivery will cease at the first quantity equal to \$5.99 worth; in this instance 4.996 gallons. Mathematical agreement is met, the quantity indication is correct, but the volume is 0.004 gallon less than requested. Expressed in cubic inches this quantity is only 0.924 cubic inch or less than 1 cubic inch.

It may be difficult for some to explain this discrepancy even though it is almost an unmeasurable quantity. The problem could be even more difficult to explain in the

event that mandatory rationing is established in the United States. It is the view of the committee that this issue impacts on weights and measures officials, consumers, equipment manufacturers, equipment users, and other officials having responsibility for a rationing program. The committee would appreciate receiving the views of all parties on this problem.

Further discussion ensued concerning the second sentence in this paragraph which reads: "Money value divisions shall not be greater than one percent of the unit price rounded up to the next higher cent." It is the committee's view that this requirement should be a separate paragraph with an appropriate clarifying heading and recommends code revision by adding the following subparagraphs:

S.1.4.4.1. MONEY VALUE DIVISIONS, ANALOG. - The value of the graduated intervals representing money values on a computing type device with analog indications shall be as follows:

(a) Not more than 1 cent at all unit prices up to and including \$1.00.

(b) Not more than 2 cents at all unit prices greater than \$1.00 up to and including \$3.00.

(c) Not more than 5 cents at all unit prices greater than \$3.00.

S.1.4.4.2. MONEY VALUE DIVISIONS, DIGITAL. - A computing type device with digital indications shall comply with the requirements of paragraph G.S.5.5. Money Values, Mathematical Agreement, and the total price computation shall be based on quantities not exceeding 0.01 gallon intervals for devices indicating in inch-pound units and 0.02 liter for devices indicating in metric units.

Delete second sentence of paragraph S.1.4.4.

Further discussion ensued on the last sentence of this paragraph which reads: "Any analog money value indication shall be in mathematical agreement with its associated quantity indication to the nearest money value graduation." It is the view of the committee that for clarification purposes this sentence should be amended to read:

Any analog money value indication shall not differ from the mathematically computed money value (Quantity x

Unit Price = Sales Price), for any delivered quantity, by an amount greater than one-half the value of the money value division.

(Item 303-1 was adopted.)

303-2 T.2.1. TOLERANCE VALUES/ON RETAIL DEVICES EXCEPT SLOW-FLOW METERS.

Several comments had been received on this paragraph. The committee had also referenced this paragraph in its report to the 64th Conference in 1979. This paragraph had also been the subject of discussion at many preceding conferences and between a large number of weights and measures officials for at least the last 20 years. The committee reviewed all of this material and the following served as the basis for their recommendation for action by the 65th National Conference on Weights and Measures (1980).

- o Existing tolerances have been in effect for over 50 years and measurement technology has certainly advanced since that time as clearly indicated by the test results reviewed.
- o Compatibility between tolerance values for devices indicating in inch-pound units and for devices indicating in metric units is necessary.
- o A 19-liter test draft is an interim measure only.

Therefore, the committee recommends code revision by deleting T.2.1. and substituting the following:

T.2.1. TOLERANCE VALUES/ON RETAIL DEVICES EXCEPT SLOW-FLOW METERS.

T.2.1.1. FOR DEVICES INDICATING IN INCH-POUND UNITS. The maintenance tolerance on normal and special tests, except on elapsed time tests, shall be one cubic inch plus one cubic inch per indicated gallon. The acceptance tolerance shall be 1/2 the maintenance tolerance.

T.2.1.2. FOR DEVICES INDICATING IN METRIC UNITS. The maintenance tolerance on normal and special tests, except on elapsed time tests, shall be 20 milliliters, plus 4 milliliters per indicated liter. The acceptance tolerance shall be 1/2 the maintenance tolerance. The tolerance applied to a 19-liter draft shall be that tolerance applicable to a 20-liter draft.

(Item 303-2 was adopted.)

303-3 METRIC REPORT

During the interim meeting, the committee heard a number of comments including a report by Stephen Vastagh, a staff member of the U.S. Metric Board, responsible for coordinating the change to liters at the "gas pumps."

From all the information available, it was evident to the committee that there is a definite trend toward the retail merchandising of fuel by the liter. The committee is encouraged by this, since it has always been its view that the U.S. will eventually be predominantly metric and that metric conversion of "gas pumps" is an example of a cost effective procedure for solving a problem resulting from inflation.

Motor fuel is now being sold at retail by the liter in 45 States. It is the view of the committee that this is sufficient justification for the elimination of another problem in metric conversion, by the establishment of liter-based tax rates. The committee recommends that each State establish or make provisions for liter-based tax rates including associated matters such as rules for rounding, guidelines for reporting and refunding for all types of motor fuels. The committee further recommends that for the sake of uniformity an ad hoc task force of the North American Gasoline and Tax Conference be formed to review these issues, to review the work that has already been done by some States and to develop basic guidelines and model legislative language for use by all States. The timely solution of these issues will serve the best interests of the States, wholesalers, retailers and consumers as well.

(Item 303-3 was adopted.)

303-4 METRIC EQUIVALENTS

The committee was requested to provide metric equivalents for inch-pound values for various commercial and other transactions. The committee responds that the National Bureau of Standards published equivalent rounded values are: 3.785 411 784 liters = 1 gallon, 0.264 172 052 4 gallon = 1 liter.

The committee recommends that a "Rule of Reason" should apply and that the value used should be consistent with the kind and quantity of the transaction. The conversion factor should never have fewer than four significant

digits and should have at least the same number of significant digits as the number of significant digits in the quantity of product being converted. For example, if a 1000 gallon delivery were to be converted to liters the value would be 3785 liters; for 10 000 gallon - 37 854 liters; for 100 gallons - 378.5 liters.

In the case of expressing a unit price equivalent for consumer value comparisons, the committee recommends the following formula:

(Advertised, posted, or computing device unit price per liter) x 3.785 = (equivalent unit price per gallon, rounded to the nearest 1/10 cent.)

For example:

26.9 cents per liter x 3.785 = \$1.018 per gallon
26.8 cents per liter x 3.785 = \$1.014 per gallon
26.7 cents per liter x 3.785 = \$1.011 per gallon
26.5 cents per liter x 3.785 = \$1.003 per gallon
26.4 cents per liter x 3.785 = \$0.999 per gallon

This method, in the committee's view, is preferable to the alternative method of dividing the price per gallon by 3.785, which results in the same price per liter for 3 or more different prices per gallon, when rounded to the 1/10 cent. For example:

\$1.009 ÷ 3.785 = 26.7 cents
\$1.010 ÷ 3.785 = 26.7 cents
\$1.011 ÷ 3.785 = 26.7 cents
\$1.012 ÷ 3.785 = 26.7 cents

Further considerations with respect to price posting and other conversion values discussed by and referenced to the committee were considered by the committee to be outside its purview and have been referred to the Policy and Coordination Committee for appropriate action.

(Item 303-4 was adopted.)

303-5 INTERIM MEASURES

The committee recommended to the P&C committee that jurisdictions be encouraged to follow the National Conference on Weights and Measures policy guidelines and require that all interim measures used for "gas pumps" not capable of computing on the basis of unit prices above 99.9 cents be eliminated from use as early as practical and in any

case not later than December 31, 1981, and that on January 1, 1982, all devices be in full compliance with the Code.

(Item 303-5 was adopted.)

304 CODE FOR VEHICLE-TANK METERS (3.31.)

304-1 TEMPERATURE COMPENSATION

The committee once again reviewed this issue and its recommendation, consistent with last years' recommendations is as follows:

Since automatic temperature compensators that interface with vehicle-tank meters are apparently readily available from several manufacturers, and currently in commercial use, it is the view of the committee that this technology should be recognized in the Code for Vehicle-Tank Meters. It is also the committee's view and intent that this action neither requires this equipment to be used, nor does it make its use entirely voluntary. It merely removes an obstacle if, in the sale of any product measured by a vehicle-tank meter, it is considered appropriate and legal to compensate for temperature variations.

The specific changes recommended for adoption in the Code are as follows:

S.2.4. THERMOMETER WELL. - Means shall be provided for inserting, for test purposes, a mercury-in-glass thermometer either

(a) in the liquid chamber of the meter, or

(b) in the meter inlet or discharge line and immediately adjacent to the meter.

S.2.5. AUTOMATIC TEMPERATURE COMPENSATION. - A device may be equipped with an adjustable automatic means for adjusting the indication and registration of the measured volume of product to the volume at 60 °F.

S.2.5.1. PROVISION FOR DEACTIVATING. - On a device equipped with an automatic temperature compensating mechanism that will indicate or record only in terms of gallons compensated to 60 °F, provision shall be made to facilitate the deactivation of the automatic temperature compensating mechanism so that the meter may indicate, and record if it is equipped to record, in terms of the uncompensated volume.

S.2.5.2. PROVISION FOR SEALING. - Provision shall be made for applying security seals in such a manner that an automatic temperature-compensating system cannot be disconnected and that no adjustment may be made to the system.

S.5.5. TEMPERATURE COMPENSATION. - If a device is equipped with an automatic temperature compensator, the primary indicating elements, recording elements, and recorded representation shall be clearly and conspicuously marked to show that the volume delivered has been adjusted to the volume at 60 °F.

N.4.1. NORMAL TESTS. - The "normal" test of a device shall be made at the maximum discharge rate that may be anticipated under the conditions of installation. If the device is equipped with an automatic temperature compensator, this test should be conducted with the compensator deactivated and activated.*

*Note: This amendment clearly states that both activated and deactivated tests are normal tests.

N.4.1.1. AUTOMATIC TEMPERATURE COMPENSATION. - If a device is equipped with an automatic temperature compensator, the compensator shall be tested by comparing; 1) the volume indicated or recorded by the device with the compensator connected and operating with, 2) the actual delivered volume corrected to 60 °F.

N. 5. TEMPERATURE CORRECTION. - Corrections shall be made for any changes in volume resulting from the differences in liquid temperatures between time of passage through the meter and time of volumetric determination in the test measure.

T.3. TOLERANCES FOR AUTOMATIC TEMPERATURE COMPENSATORS ON VEHICLE TANK METERS. To the tolerances that would otherwise be applied to the device under test, there shall be added an amount equal to the change in the volume of the product for a 2 °F change in temperature.

UR.2.4. TEMPERATURE COMPENSATION.

UR.2.4.1. USE OF AUTOMATIC TEMPERATURE COMPENSATORS. - If a device is equipped with an automatic temperature compensator, this shall be connected, operable, and

in use at all times. Such automatic temperature compensator may not be removed, nor may a compensated device be replaced with an uncompensated device, without the written approval of the weights and measures authority having jurisdiction over the device.

UR.2.4.2. WRITTEN INVOICES. - Any written invoice based on a reading of a device that is equipped with an automatic temperature compensator shall show thereon that the volume delivered has been adjusted to the volume at 60 °F.

UR.2.4.3. NONAUTOMATIC TEMPERATURE COMPENSATION. If the volume of the product delivered is adjusted to the volume at 60 °F, the product temperature shall be taken during the delivery in the liquid chamber of the meter or in the meter inlet or discharge line adjacent to the meter. The accompanying invoice shall indicate that the volume of the product has been adjusted for temperature variations to a volume of 60 °F and shall also state the product temperature used in making the adjustment.

(After a lengthy discussion, Item 304-1 was defeated.)

304-2 T.2. TOLERANCE VALUES.

The committee was requested to provide tolerance values in metric units for devices indicating in metric units. The committee is in the process of reviewing existing tolerances and developing appropriate and equitable metric equivalents. It already has a working draft but wishes to receive ideas from interested Conference members before making a recommendation for Conference action. It would appreciate receiving comments during the ensuing year.

(Item 304-2 was adopted.)

304-3 TEST PROCEDURES AND METRIC EQUIVALENTS

In order to provide guidance to those testing vehicle tank meters that indicate in metric units, with 100 gallon or 200-gallon provers, the committee recommends:

If:

Prover is 100-gallon with 10 in³ divisions, and the indicated delivery is 378.5 liters and the value of d is 0.1 liter

Then:

Acceptance Tolerance Band is: + 35 in³ (+ 3 1/2 div.)
- 40 in³ (- 4 div.)

And:

Maintenance Tolerance Band is: + 72.5 in³ (+ 7 1/4 div.)
- 77.5 in³ (- 7 3/4 div.)

If:

Prover is 100-gallon with 10 in³ divisions, and the indicated delivery is 378 liters and the value of the smallest unit d is 1 liter

Then:

Acceptance Tolerance Band is: + 4.5 in³ (+ 1/2 div.)
- 70.5 in³ (- 7 div.)

And:

Maintenance Tolerance Band is: + 42 in³ (+ 4 div.)
-108 in³ (- 11 div.)

If:

Prover is 200-gallon with 10 in³ divisions, and the indicated delivery is 757.0 liters and the value of d is 1 liter or 0.1 liter

Then:

Acceptance Tolerance Band is: + 57.5 in³ (+ 5 3/4 div.)
- 67.5 in³ (- 6 3/4 div.)

And:

Maintenance Tolerance Band is: + 120 in³ (+ 12 div.)
- 130 in³ (- 13 div.)

(Item 304-3 was adopted.)

305 LIQUEFIED PETROLEUM GAS VAPOR-MEASURING DEVICES (3.33)

305-1 S.2.1. PRESSURE REGULATION.

In order to provide a clear meaning to this paragraph, the committee recommends this paragraph be amended to read:

S.2.1. PRESSURE REGULATION. - The vapor should be measured at a gage pressure of 11 inches of water (0.40 psi) \pm 2.75 inches of water (0.10 psi). Where vapor is being measured at a pressure other than 11 inches, a volume multiplier shall be applied based on the following equation:

Volume Multiplier =
$$\frac{\text{atmospheric pressure (psia)} + \text{gage pressure (psi)}}{\text{atmospheric pressure (psia)} + 0.40 \text{ psi}}$$

(Item 305 was adopted.)

306 VEHICLE TANKS USED AS MEASURES (4.40)

306-1 VEHICLE TANKS USED TO COLLECT LIQUID WASTE

The committee received a comment that some vehicle tanks used to collect liquid waste were marked for capacity only in terms of 1/4, 1/2, 3/4, and full. The comment concluded that these values were not precise enough, and that the code should be amended to provide specific quantity level markings. The committee recommends that if this is considered a problem in any jurisdiction, the jurisdiction could apply the principles expressed in G-A.3. Special and Unclassified Equipment to specify liquid levels deemed appropriate. If the committee receives further evidence that this is a national problem, it will provide more specific criteria in the future.

(Item 306 was adopted.)

307 CODE FOR FARM MILK TANKS (4.43)

307-1 T.4. BASIC TOLERANCE VALUES, MASTER METER METHOD.

The committee received a recommendation that this tolerance value should be reduced from 0.4% to 0.2%. The committee's response relating to standard and system uncertainties is as follows:

The 5-gallon sticker plate standard provided by NBS is the State Primary Standard. This standard has an uncertainty of $\pm 0.02\%$. This uncertainty value is transferred to any other prover calibrated from it, and then to that value must be added $\pm 0.02\%$ uncertainty on the prover being calibrated. Thus, the uncertainty in the volumetric provers used to verify the meter used to calibrate the tanks is $\pm 0.04\%$.

Added to the value must be the uncertainty of the metering system and the measurement process. This value is generally accepted as 0.05%. Thus, the standard uncertainty is 0.09%. Since the error in the standard cannot exceed 25% of the smallest tolerance applied (H-44, pages 1-9), the smallest tolerance value becomes $4 \times 0.09\% = 0.36\%$. It is on this basis that the value of 0.4% was developed and cannot effectively be reduced

to any value less than 0.36%. Consequently, the committee recommends no action on this item.

(Item 307-1 was adopted.)

307-2 GAGE RODS

A comment was received that long gage rods on larger tanks were bending and causing other measurement problems. It is the view of the committee that the measurement process would be improved with the use of external gage assemblies on large tanks and recommends code amendment by adding the following new non-retroactive paragraph:

S.3.7. DESIGN OF INDICATING MEANS ON TANKS WITH A CAPACITY GREATER THAN 2000 GALLONS OR 8000 LITERS.
Any farm milk tank with a capacity greater than 2000 gallons - or 8000 liters - shall be equipped with an external gage assembly. [Non-retroactive and applicable only to tanks manufactured after January 1, 1981.]

(A motion to amend by adding applicability date of January 1, 1981 passed. Item 307-2 as amended was adopted.)

307-3 S.3.6.3. VALUE OF GRADUATED INTERVAL.

The committee received a comment that when a certain manufacturer changed his gage rod graduations from the inch-pound system to the metric system, several of his tanks, at the least sensitive level, slightly exceeded the requirements of this paragraph. The change was from 1/32 inch graduations to 1 mm (approx. 1/25 inch). The committee feels this sensitivity value should not be compromised; it therefore recommends no change to the code, and does not view this action as a hindrance to metric conversion. There are other options available to the manufacturer that do not increase this sensitivity value.

(Item 307-3 was adopted.)

307-4 METRIC CONVERSION

To facilitate an orderly change to metric, the committee recommends this code be amended to accommodate metric measurement. The changes recommended are as follows:

Change the word "gallorage" or "gallons" to "volume" or the change as indicated in the following paragraphs:

S.1.(c) gallons - volume
 S.3.2. gallorage - volume
 S.3.4. gallorage - volume
 S.3.6.2. inches - add or centimeters
 inches - add or centimeters
 gallorage - volume
 gallons - the volume
 gallorage - volume
 gallons - volume
 S.4.; S.4.1.;
 S.4.2.; S.4.3.; gallorage - volume
 S.4.4.; S.5.3.;
 S.6.

 S.2.2.1. 500 gallons - add or 2000 liters
 S.4.2. 250 gallons - add or 1000 liters
 1/4 gallon - add or 1 liter
 S.4.3. 251 gallons - add or 1001 liters
 500 gallons - add or 2000 liters
 1/2 gallon - add or 2 liters
 S.4.4. 500 gallons - add or 2000 liters
 gallon - add or 4 liters
 T.2. 1/2 gallon - add or 2 liters
 UR.3. pounds per gallon - weight per unit volume
 gallorage - volume

S.3.6.3.		<u>Gallons</u>	-	<u>Liters</u>
<u>Interval</u>	<u>Capacity</u>		<u>Interval</u>	<u>Capacity</u>
(a) 1/2	250		2	1000
(b) 1	251 - 500		4	1001 - 2000
(c) 1 1/2	501 - 1500		6	2001 - 6000
(d) 2	1501 - 2500		8	6001 - 10 000
(e) 1 add	over 250		add 4	over 10 000

Definition: farm milk tank gallons - volume

(Item 307-4 was adopted.)

308 CODE FOR TAXIMETERS (5.54)

308-1 T.1. TOLERANCE VALUES.

The committee received a recommendation to eliminate the 100-foot tolerance in T.1.1.(b), to change T.1.2.1.(a) and (b) to ± 5 seconds on the initial intervals and ± 2 seconds per minute on subsequent intervals, and change T.1.2.2. to $\pm 1 \frac{1}{2}$ seconds per minute.

The committee offers the following comments and recommendations:

The taximeter is so designed that the customer is always charged in advance for any distance or time interval. Thus, the customer may receive as little as one foot or one second for the last drop of his trip. This is the reason that the tolerances are greater on underregistration than overregistration, and the committee recommends no change.

It is also the view of the committee that the suggestion to eliminate the added tolerance of 100 feet whenever the initial interval is included in the interval under test is premature and not supported by data covering the broad spectrum of taximeters in use today. This change was possibly proposed under the impression that we are dealing with new and more accurately designed electronic taximeters. The committee wishes to remind the Conference that this is not the case, and that there are many kinds and types of taximeters in use today. Also there are many variables such as gear ratio, tire size, type, construction, speed and inflation, which will result in a wide variation in the performance of the system. The 100 feet also allows the taximeter mechanic a broader tolerance range to work with when necessary, without exceeding the tolerance on overregistration.

(Item 308 was adopted.)

309

OTHER ITEMS

309-1 NATIONAL BUREAU OF STANDARDS HANDBOOK 44

The committee has received many comments on the new Handbook 44 format. Most were favorable and others indicated that additional improvements can be made.

It is the goal of the committee to provide a viable and readily usable document. Accordingly, the committee will continue to recommend changes in format to the Conference. It has made use of many of the comments already received and urges Conference members to continue providing suggestions for improvement. The committee is considering a format in which the requirements applicable to electronic designs are consolidated in a separate section.

(Item 309-1 was adopted.)

309-2 FIELD STANDARD TEST WEIGHTS

The committee was informed that for testing vehicle scales, there are in use today field standard test weights that are powered by liquid fuel which is consumed during the conduct of the test. The committee wishes to advise the Conference that in most instances it is impossible to maintain these devices within the tolerance limits (1/10 000) as required by National Bureau of Standards Handbook 105-1 or within 25% of the smallest tolerance applicable as required by NBS Handbook 44.

(Item 309-2 was adopted.)

309-3 RECOMMENDATIONS TO THE COMMITTEE

The committee wishes to advise the National Conference that in order for it to act effectively on recommendations it receives, the following information must be included:

- (a) A definition or explanation of the problem,
- (b) Recommended action, such as Handbook 44 amendment, interpretation, or enforcement consideration,
- (c) Data supporting any recommended code amendment.

(Item 309-3 was adopted.)

309-4 REQUIREMENTS APPLICABLE TO ELECTRONIC EQUIPMENT

The committee has noted that most of the code amendments applicable to electronic equipment appears in the Code for Scales. It is the view of the committee that some of these new requirements are also applicable to other kinds of electronic devices. The committee is reviewing these paragraphs and it is their intent to recommend in next year's report that certain of these paragraphs be a part of the General Code. The committee would appreciate receiving comments from the members of the Conference on this subject.

(Item 309-4 was adopted.)

309-5 SCALES USED FOR WEIGHING PRECIOUS METALS

The committee has developed guidelines to aid in determining the appropriateness of and the requirements applicable to these devices and will circulate them shortly after this Conference.

(Item 309-5 was adopted.)

The committee expresses its appreciation to all who have contributed to and participated in the development of this report. The committee urges all interested parties to promptly respond on matters of concern. It is only through this cooperative effort that the Conference can continue to attain uniform and equitable measurement standards.

D. A. Guensler, California, Chairman
L. H. DeGrange, Maryland
F. Nagele, Michigan
G. L. Delano, Montana
S. A. Colbrook, Illinois
O. K. Warnlof, Staff Assistant, NBS
H. F. Wollin, Executive Secretary, NCWM

COMMITTEE ON SPECIFICATIONS AND TOLERANCES

(On motion by the committee chairman, the report of the Committee on Specifications and Tolerances voting key items 300 through 309-5 was adopted in its entirety as amended by the Conference. The results of the voting in the House of State Representatives and the House of Delegates under the Conference voting system are totaled in the table that follows. The Conference also authorized the Executive Secretary to make any appropriate editorial changes in the language adopted by the Conference, provided that the requirements thus adopted are strictly adhered to.)

VOTING RESULTS--Committee on Specifications and Tolerances

Voting Key	House of State Representatives		House of Delegates	
	Yes	No	Yes	No
300	42	0	54	0
301-1A	25	10	13	23
301-1	32	4	39	10
301-2	36	0	55	0
301-3	35	1	43	0
301-4	42	0	55	0
301-5	18	23	14	45
301-6 } 301-7 }	39	0	58	0
302	41	0	60	0
303-1	39	0	56	2
303-2	37	0	54	0
303-3 } 303-4 } 303-5 }	40	0	57	0
304-1	26	13	26	33
304-2 } 304-3 }	39	0	54	0
305 } 306 }	40	0	58	0
307-1 } 307-2 } 307-3 } 307-4 }	40	0	56	0

House of State
Representatives

House of Delegates

Voting Key

	Yes	No	Yes	No
307-2A	38	0	53	0
308	40	1	44	1
309-1)	39	1	50	3
309-2)				
309-3)				
309-4)				
309-5)				

A = Amendment

REPORT OF THE COMMITTEE ON EDUCATION,
ADMINISTRATION, AND CONSUMER AFFAIRS

Presented by STAN J. DARSEY, Chief,
Bureau of Weights and Measures, State of Florida

(Thursday, June 26, 1980)

VOTING KEY



400

INTRODUCTION

The committee on Education, Administration, and Consumer Affairs presents its final report to the 65th National Conference on Weights and Measures. The report consists of the tentative report as offered in the Conference Announcement, and as amended by the final report. The report represents recommendations of the committee that have been formed on the basis of written and oral comments received during the year and oral presentations made during the open meeting of the committee.

401

NATIONAL WEIGHTS AND MEASURES WEEK

One of the important responsibilities of the committee is the coordinating of National Weights and Measures Week each year. Mr. Robert Walker of Indiana who served as National Chairman for the 1980 Week is sincerely commended by the committee for his very successful effort to secure promotional materials and for his overall effort to make the Week a success.

Along with the usual efforts to distribute material and publicize the Week, much effort has been expended by other officials to have a Proclamation, signed by the President of the United States, calling attention to the work of the weights and measures officials across the Nation. Senator Mathias of Maryland has introduced Senate Joint Resolution No. 148 which provides for a Presidential Proclamation declaring March 1-7, 1981, National Weights and Measures Week.

This Resolution is presently in Committee and to move it out of Committee it must have the support of a minimum of twenty-five U.S. Senators of whom at least ten must be Democrats and at least ten Republicans. It is

essential that Conference delegates contact their Senators for support of this Resolution by no later than mid-July 1980. Your Senator should address his support directly to Senator Edward Kennedy, Chairman of the Judiciary Committee.

The committee would like to personally thank Dick Hurley of Fairbanks Weighing Division, Colt Industries, Tom Stabler of Toledo Scale, Fred Katterheinrich of Hobart Corporation, and Ray Lloyd of the Scale Manufacturers Association, not only for their individual efforts and help, but also for the excellent promotional materials they provided for all of the coordinators for the Week.

In order to assure the continuity of future successful Weights and Measures Week, the committee is very happy to announce that Mr. Allen Christie, State of South Dakota, has very graciously accepted the Chairmanship for National Weights and Measures Week for the year 1981.

The committee is happy to announce that the theme for the 1981 week will be WEIGHTS AND MEASURES - EQUITY FOR ALL.

(Item 401 was adopted)

402

PROMOTIONAL ACTIVITIES

Approximately thirty-five remaining Conference membership plaques were offered for sale at \$5 each during the 65th Conference in Washington. Since the announcement of the new membership plan, a greater interest in obtaining the plaques has become evident.

The committee has had several requests for the Conference neckties that were so successfully offered for sale two years ago. Plans are underway to explore the possibility of obtaining a new supply of the Conference ties in both the clip-on and hand tie types.

(Item 402 was adopted)

403

NATIONAL TRAINING PROGRAM

In accordance with the committee's projected timetable for this item, Dick Smith, Staff Assistant, did attend and appear on the program of each of the four regional associations to explain the proposed program and seek the support of the Regional Education Committees in reaching our goal. In each case, everyone agreed with the new

concept and pledged support. The followthrough in helping us get each State into a regional training group and to have each State name someone as training coordinator has been slow, but progress is being made. At this time we have eight well-established regional groups, representing more than half of the fifty States, and twelve States have formally named State training coordinators.

The committee wishes to thank those States that have taken positive steps in this regard and urges the Regional Conferences to continue to assist them by getting the remaining States to take action. One hundred percent cooperation and participation is needed if we are to receive maximum benefit from this new approach.

(Item 403 was adopted)

404 WEIGHTS AND MEASURES PROGRAM EVALUATION

The committee feels that the weights and measures program evaluation criteria are ready for testing. Therefore, between the interim meetings and the 65th National Conference in June, each member of the Education, Administration, and Consumer Affairs Committee voluntarily tested the criteria by answering the questions as they relate to his own jurisdiction.

These trial evaluations have been completed by all committee members of their respective jurisdictions. The data obtained were circulated among the committee and the results were used in the committee's continuing effort to further refine the criteria.

The committee is now prepared to conduct a minimum of three on-site evaluations between now and the interim meetings in January 1981. To begin this pilot program of evaluations, the committee requests that the Conference approve a sum, not to exceed \$2500.00, for expenses during the upcoming Conference year to conduct on-site evaluations.

We encourage any jurisdictions wishing to be evaluated during the pilot period to communicate with our staff assistant, Dick Smith, at NBS, or any member of our committee, during or as soon after the annual Conference as possible.

(Item 404 was adopted)

405 IMPROVED EDUCATIONAL OPPORTUNITIES

Tom Stabler, Manager of Weights and Measures for Toledo Scale, gave the committee a presentation outlining

educational opportunities for weights and measures officials, users, and service personnel offered by Toledo Scale and Great Lakes Division of NSMA. During this presentation, the committee was advised of plans of a committee made up of Ohio weights and measures and industry officials to explore the possibility of establishing a formal after hours training program leading to a certificate or diploma at a local college or university. Contact has been made and the project is being studied by Capitol University, Wilmington College of Ohio, Ohio State University, Batelle Memorial Institute, and the University of Akron.

In addition, an Institute for Weights and Measures has been established for the purpose of service weights and measures officials, industry service personnel, and users of commercial weighing and measuring equipment. The Institute conducts seminars, training courses, and other technical programs that are specifically designed to assist the fieldperson in the conduct of his or her professional responsibilities: inspection and testing of commercial equipment, servicing of weighing and measuring devices, and assuring accurate measurements in commerce.

Faculty of the Institute for Weights and Measures consists of university professors and guest instructors from industry and government. All are highly qualified and motivated in the technical subject areas they represent. The faculty teaches on-campus short courses, extension technical seminars, and correspondence courses. "Hands-on" and field training are emphasized. A laboratory shop is equipped with devices representative of those found in the field and, in addition, contains equipment of the latest technology employed in weighing and measuring.

The Institute awards certificates to participants upon completion of a planned curriculum. The certificate is recognition of achievement in a highly technical field where professional skills are required by all who participate: the official, serviceperson, and user.

The Institute for Weights and Measures has been founded to support the effort toward equity in the marketplace and uniform weights and measures. The Institute provides the technical program essential for qualifying individuals engaged in vital employment to achieve these objectives.

Information was also provided to the committee by Al Tholen, Chief of the Office of Weights and Measures, regarding contacts that have been made with universities

in Texas and California during the past year. Interest has been expressed by the universities contacted at the graduate, undergraduate, adult education, and extension services levels. Both Texas A&M and the University of Texas at Dallas have sent high level officials to NBS to explore the feasibility of developing such programs and return visits to the respective campuses have been made by NBS officials. It appears that the extension service at Texas A&M is well able and interested in establishing technician or inspector level training for weights and measures officials.

During the committee's open hearing, Dr. Lee Phillips from Texas A&M University informed the committee of a seminar to be held in early January at the University to further explore interest level and possible curriculum development for a formal extension service program in the weights and measures field. Dr. Phillips requested future participation of this committee in the development of this program and extended an invitation for committee members to attend the seminar.

Several conference delegates and the committee's staff assistant took advantage of the opportunity to attend open sessions of the OIML Conference as U.S. observers. It was learned during this conference that member countries of OIML are interested and concerned regarding the increasing need for training and educational programs that would form the basis for international uniformity. The committee was also impressed by the importance given to educational programs by Mr. Birkeland of Norway during his remarks to the Conference. The committee agrees wholeheartedly that the key to national and international uniformity is effective training programs. We wish to further point out that effective educational and training programs will be necessary to meet the challenges of the eighties.

The committee has taken the position that education is the cornerstone of professionalism and, therefore, highly endorses both of the above efforts with the suggestion that correspondence courses be included in any formal program that may be developed. Comments from Conference members are invited on this subject.

(Item 405 was adopted)

406

INDUSTRY EQUIPMENT DISPLAY

The committee was asked to explore the desirability of providing space and arrangements for a formal industry

equipment display at the National Conference. After considerable discussion and input by industry representatives, it is the feeling of this committee that a formal display area is not warranted; however, if any industry members wish to display equipment at an annual conference, they may do so in their own rooms or hospitality suites, providing there is no conflict with formal Conference sessions.

(Item 406 was adopted)

407

NEW MEMBERSHIP PLAN

The committee was asked to study and comment on the new Conference brochure entitled "The National Conference on Weights and Measures - A New Membership Plan and Application Form."

After considerable study and discussion, the committee has reached the decision that this new membership plan will do much to strengthen the Conference as an organization and greatly enhance the cause of uniformity in weights and measures enforcement in this Nation. For the first time an opportunity for all interested parties to receive Conference documents and handbooks in a timely manner will be provided. The committee strongly recommends adoption of this plan by the Conference.

(Item 407 was adopted)

408

SIMPLIFIED PACKAGE CHECKING PROCEDURES

It has been called to the attention of the committee that a serious problem exists due to the fact that NBS Handbook 67 "Checking Pre-Packaged Commodities" has been out of print and unavailable for several years. Many of the States have officially adopted this handbook as part of their regulations and therefore have need for the material found in the handbook.

The committee respectfully requests that OWM look into the possibility of having this handbook reprinted as a Conference document or of having the material in the handbook incorporated into NBS Handbook 112 "Examination Procedure Outlines for Commercial Weighing and Measuring Devices" when this handbook is revised. A definite need exists for "auditing" or "screening" procedures such as are found in Handbook 67 for day-to-day routine package inspection.

The committee is cognizant of the fact that more detailed statistical sampling and checking procedures will be available in the future in the new package control handbook under development at OWM to cover those situations where court action is necessary.

(Item 408 was adopted)

409 NEW WEIGHTS AND MEASURES FILM - "THE MARKETPLACE"

The new weights and measures film, "The Marketplace," produced jointly by the National Conference and the National Bureau of Standards, continues to enjoy great interest and demand by the general public.

The committee wishes to again provide information on how to purchase or borrow the film. The purchase price of the film is \$67.50 plus \$1.50 shipping charge for either 16 mm prints or 3/4 inch video cassettes. Order from: Screen Presentations, Inc., 309 Massachusetts Avenue NE., Washington, D.C. 20002. Free loan service for the film is available from: Modern Talking Picture Service, 5000 Park Street, North, St. Petersburg, Florida 33709. Conference members are urged to take advantage of the opportunity to either purchase or borrow the film for future use.

(Item 409 was adopted)

S. J. Darsey, Florida, Interim Chairman
R. W. Walker, Indiana
J. L. Swanson, Alaska
A. L. Christie, South Dakota
R. N. Smith, Staff Assistant, NBS
H. F. Wollin, Executive Secretary, NCWM

Committee On Education, Administration,
And Consumer Affairs

(On motion of the committee chairman, the report of the Committee on Education, Administration, and Consumer Affairs, voting key items 400 through 409 was adopted in its entirety by the Conference. The results of the voting in the House of State Representatives and the House of Delegates under the Conference voting system are totalized in the table that follows. The Conference also authorized the executive secretary to make any appropriate editorial changes in the language adopted by the Conference.)

VOTING RESULTS--Committee on Education, Administration,
and Consumer Affairs

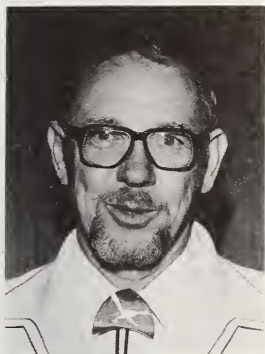
Voting Key	House of State Representatives		House of Delegates	
	Yes	No	Yes	No
400	38	0	45	0
401	37	0	44	0
402				
403				
404				
405	39	0	45	1
406				
407				
408				
409				

REPORT OF THE COMMITTEE ON LIAISON

Presented by CHARLES H. GREENE, Chief, Division
of Consumer and Marketing Services, New Mexico
Department of Agriculture, Las Cruces, New Mexico

(Thursday, June 26, 1980)

VOTING KEY



500

INTRODUCTION

The Committee on Liaison submits its report to the 65th National Conference on Weights and Measures (NCWM). The report consists of the tentative report as offered in the Conference Announcement and as amended by this final report. The report represents recommendations of the committee that have been formed on the basis of written and oral comments received during the year and oral presentations made during the open meeting of the committee.

501

STATE MEASUREMENT NEEDS STUDY

The committee was briefed by Dr. Carroll S. Brickenkamp of the Office of Weights and Measures (OWM) who outlined and discussed a study to be carried out by NBS and an outside contractor in the coming year (1980). The study's objective is to identify and assess the needs at the State and local level for accurate and uniform physical or chemical measurements which derive from governmental laws and regulations. The study will involve visits to five to ten States (in some way representative of the 50 States) by OWM staff members in the area of weights and measures. One purpose of the study is to identify the most important measurement needs of State and local governments and their local industries. Another purpose is to determine what costs are being incurred because of inaccurate measurements.

Expected dividends from this study are expected to be cost/benefit analysis information for weights and measures budget justifications as well as guidance in program planning and the establishment of priorities.

As the study progresses OWM will be in contact with individual States. States interested in participating in this study should advise OWM of their interest.

The Liaison Committee has considered in depth the procedures and capabilities of the National Conference on Weights and Measures to assess the importance of issues, to develop and refine Conference positions (particularly with respect to issues deemed crucial to Conference objectives) and to advocate the positions once developed.

As a result of these considerations the Liaison Committee offers the following tentative conclusions:

- (a) The Conference can, without a substantial investment of "new" money, improve its procedures designed to select and prioritize the issues presented to it. The committee feels that this organizational effort should be made, possibly by a steering committee composed of past Conference chairmen.

Care should be exercised to avoid formalities which unduly impede the timely consideration of issues by the Conference.

Corollary to the screening process is the development of Conference positions on adoption and revision of model laws, regulations, and handbooks. The committee is aware that the Committee on Education, Administration, and Consumer Affairs has undertaken the task of developing a format for submission of proposals to the Committees on Laws and Regulations and on Specifications and Tolerances.

While this has been an informal procedure in the past, the lack of formality apparently has not limited the effectiveness of the process in providing valid and reasonable results. The committee is cognizant of the efforts of OWM to improve scheduling of Conference items and the effect of these efforts in dealing with the increased workload imposed by advances in technology and an increasingly complex culture. The attention of the Conference is directed to the need to develop a completely functional approach to dealing with such items in order to facilitate the ability of the Conference to act effectively and efficiently.

- (b) The Conference should seek support and assistance from all appropriate sources to permit a more adequate development, substantiation, and refinement of a position prior and subsequent to adoption by the Conference. It is recognized that a well-stated and

well-documented Conference position paper is the most effective means for fully informing Conference members and preparing them for the efforts they must make in support of the Conference objectives. It is also recognized, however, that there may be little that can or should be done to revise the organization or functioning of the Conference for the purpose described until there is reason to believe that the Conference chooses to move in this direction and additional resources are made available.

- (c) One thing that is clear with respect to the role of the Conference as an advocate of its positions and with outreach to other than its members, is the need for review and clarification of the benefits of such a policy. The posture of the Conference in relation to this conceptual characteristic must be founded upon its charter and related to the Conference's ability to survive as a viable, respected forum for informational exchange, education, and debate. Advocacy by the Conference as a representative body can be highly effective when professionally accomplished. On occasion direct Conference advocacy can appear to be the most reliable and effective means of communicating a Conference position to a non-Conference decision-maker. At the same time the process of arriving at a representative position to be advocated on behalf of a substantial, loosely-knit group of independent sovereign jurisdictions may necessarily involve a polarization of views that can be counter-productive in relation to other important purposes of the Conference.

The Committee recommends that the Policy and Coordination Committee initiate and coordinate a broadly-based study and debate regarding the advantages and disadvantages of the Conference acting as an advocate of its own positions.

(Item 502 was adopted)

503

FEDERAL AGENCY ACTIVITIES

503-1 NET WEIGHT

The committee met with John McKelvey, U.S. Department of Agriculture (USDA-FSQS), and William Randolph, U.S. Food and Drug Administration (FDA) concerning the status of the proposed USDA net weight regulations and any pending FDA actions or regulations.

At this time it appears there will be several changes from the December 2, 1977, USDA proposal in a re-proposal

to be published for public comment. No exact changes could be disclosed by USDA; however, it was intimated that the proposal would be similar to the 1977 proposal. It was stated that the proposal would also include some provisions from a 1973 proposal and would supersede both the 1973 and 1977 proposals. It was stated that the issue is a priority item on the USDA calendar.

FDA will be making a companion net weight proposal to be published simultaneously with the USDA re-proposal. As a result of USDA and FDA joint meetings the two proposals are expected to be fundamentally the same.

Representatives of the Federal Trade Commission (FTC) were not present at this meeting. However, it was not anticipated that FTC will propose an additional or alternative net weight proposal. Rather, it was reported that FTC has indicated it will utilize FDA regulations for all consumer commodities.

The committee recommends that if the comment period for the two expected proposals expires prior to the next Conference (July 1981) the Conference Executive Committee, through the Conference Chairman, formulate and express the position of the Conference. The committee also advises weights and measures officials of the need and value of their comments to USDA and FDA as individuals or representatives of their respective jurisdictions. Comments relative to proposal provisions should include reasons for approval or disapproval and should include suggestions when appropriate. The committee feels that the joint efforts of USDA and FDA for uniformity in regulations is commendable and deserves the cooperation of the NCWM and NBS.

(Item 503-1 was adopted)

503-2 FEDERAL GRAIN INSPECTION SERVICE (FGIS)

The committee met in January with representatives of the FGIS. Present were Dr. Leland Bartelt, Administrator, Mr. Dick Pforr, Chief, Scales and Weighing Branch, and Mr. Ben Banks, Scales and Weighing Specialist.

The purpose of the meeting was to discuss the relationship between FGIS and the Conference and member jurisdictions and to seek ways to enhance cooperation between FGIS and the weights and measures community. The committee expressed the concern communicated to it by Conference members that FGIS has not taken full advantage of the expertise that exists in State and local jurisdictions relative to weights and measures in general and grain weighing in particular. Efforts should be made by

FGIS and the weights and measures community to establish agreement on specific comprehensive test procedures to be used in testing scales under FGIS mandate. Communication should be improved between the organizations involved so that each fully understands the test objectives and data obtained and is in complete agreement concerning the test results.

It is the position of FGIS that, where their scale specifications are different, these differences are the result of the mandate that Congress gave FGIS to resolve grain weighing and inspection problems. The FGIS has patterned their scale specifications after Handbook 44, and has proposed regulations which differ from Handbook 44 only in the tolerances to be applied.

Dr. Bartelt stated the FGIS intention to utilize other than Federal employees to test grain scales. A Federal inspector will observe all tests on grain scales that come under the purview of FGIS. These are basically the 600 or so scales at grain export locations. Dr. Bartelt was asked about the possibility of a program of Federal-State agreements similar to those that the Packers and Stockyards Administration has for testing livestock scales. He indicated this was a possibility for future consideration.

Another subject discussed has to do with scale prototype approval. FGIS expressed an interest in participating in and being a part of any national program for scale prototype examination. It is the committee's understanding that an FGIS representative has been added to the National Task Force on Type Approval.

The U.S. Grain Standards Act and its amendments, which established the FGIS, imposed some requirements on FGIS to deal with grain weighing and inspection in such a manner as to correct some very real problems in grain exporting, and to develop a better grain weighing and inspection system than existed at the time. Insofar as their grain weighing activities are concerned, there are substantial areas of common interest with State and local weights and measures officials. It is the committee's recommendation that the Conference and its members and the Federal Grain Inspection Service strive for full cooperation in scale specification and tolerances, testing and certification of scales, design criteria and type approval for grain scales, and other areas of mutual concern.

(Item 503-2 was adopted)

Traceability for railroad track scales depends on a series of interconnecting links. Few States have the resources to provide testing and certification through State-owned standards. Thus, the railroads have owned most of the standards and have done most of the testing. Some States participate in the testing and certify correct scales. Most State and local weights and measures jurisdictions are not involved.

Railroad track scales are generally tested by test cars owned by the railroad that owns the scale. Verification of these test cars for purposes of traceability is done on "master" scales. There are presently 16 of these owned by railroads and located at various points around the nation.

The National Bureau of Standards for a long period of years owned two test cars, known as NBS 1 and NBS 2, which were used to verify the "master" scales. NBS 1 and NBS 2 in turn had their test weights calibrated at Clearing Illinois at a facility owned and operated by NBS. The Clearing, Illinois, facility has a master scale and a set of standards used to keep the scale in calibration. The standards were periodically returned to the Bureau for recalibration.

In summary, the traceability chain passed from NBS through its test facility at Clearing, through its test cars, through the railroads' master scales, through the railroads' test cars, to the 5500 or so commercial railroad track scales in the various States. There are two weak links in this chain. One is the small number of State and local jurisdictions participating in the testing and certification of the scales. The other weak link was lack of adequate funding to keep the two NBS test cars in repair, to maintain the Clearing Illinois facility, and to operate the program. The Association of American Railroads (AAR) was contributing funds plus moving the test cars. NBS has put no funds into this program since 1975. The AAR support has not been adequate to maintain both test cars in good operating condition. NBS 1 has been idle due to poor condition since 1976. Thus it was difficult for NBS to check the railroad master scales at appropriate intervals.

NBS has completed an agreement with the FGIS to transfer NBS 1 and NBS 2, and an extra set of nine ten-thousand pound weights to FGIS. NBS 2 has been refurbished and transferred to FGIS in good operating condition. A replacement for NBS 1 has been purchased. The

standards and equipment will be installed, and the car will be operational in the near future.

NBS is currently seeking to transfer ownership and operation of the Clearing Illinois facility to another entity. This was earlier reported to be the State of Illinois, but it now appears that this is more likely to be FGIS.

A representative of FGIS explains that they intend to test the master scales once each year. They will also test 36 railroad track scales at grain export locations twice a year. According to the FGIS representative, the test cars will not be made available to test any railroad track scale that does not come under FGIS jurisdiction. It was reported that AAR is expected to continue to fund the program at essentially the same level as before, and will continue to move the test cars.

It is of concern to the committee that traceability for railroad track scales will soon be indirect and will be from the NBS through FGIS (or possibly the State of Illinois and FGIS) to the master scales. The committee has been assured by OWM that it will continue to review the operation of the program. The committee has been further assured by OWM and FGIS that the processes of calibrating the primary standards, training the personnel in measurement assurance, and certifying the Clearing Illinois facility will in themselves provide the necessary assurances of traceability.

It is the recommendation of the committee that the Conference work with the National Bureau of Standards to develop appropriate mechanisms to assure traceability for railroad track scales. It is further recommended that the Conference develop recommendations to its member jurisdictions on ways to become involved in the testing and certification of railroad track scales. This might be accomplished by means of an ad hoc committee consisting of representatives of NCWM, NBS, and AAR.

(Item 503-3 was adopted)

503-4 SPHYGMOMANOMETERS

In October 1979 the Association for the Advancement of Medical Instrumentation (AAMI) submitted two drafts on sphygmomanometers for consideration by the AAMI Sphygmomanometer Committee and other interested parties. One draft was a proposed standard for nonautomated sphygmomanometers and the other draft was a proposed Standard for Electronic or Automated Sphygmomanometers. Comments on

the drafts were received by the AAMI Sphygmomanometer Committee at their meeting in November 1979. Balloting on the Standards will be completed before the AAMI Sphygmomanometer Committee meeting in April 1980. If approved by the committee, the two documents would then be submitted to the American National Standards Institute for public review and final approval.

(Item 503-4 was adopted)

503-5 ICE-GLAZED SEAFOODS

The National Marine Fisheries Service (NMFS) requested advice and cooperation in an effort to standardize the method of measuring the net contents of ice-glazed seafoods. Representatives of the Service suggested that the service, FDA, and State agencies may all be using different methods. It was subsequently decided by the Committee that the first action required is to achieve the agreement of the NMFS and FDA regarding the method. Thereafter the Committee met with FDA representatives and were advised that both the Service and the FDA use the same American Organization of Analytical Chemists (AOAC) procedure. It was acknowledged that for budgetary reasons the FDA has been unable to initiate checks or enforcement action, with the result that producers not participating in the Service's voluntary seafood inspection program may not be adhering to standards required by the Service.

Certain State weights and measures officials have confirmed that they have experienced difficulties achieving consistent results using the AOAC method, and others observed that the cost of destructive testing is such that the product is infrequently checked in their jurisdictions. The committee has received an unsubstantiated impression that there may be a commercial problem of some dimension.

More input is needed from member jurisdictions regarding their experiences with the official test procedure and the results of their testing for net quantity compliance. Until more input is received, the committee can take no further action on this issue.

(Item 503-5 was adopted)

503-6 AEROSOL PACKAGE LABELING

On May 4, 1979, the NCWM petitioned the FDA to amend its regulations to require that food and cosmetic aerosol products bear declarations of quantity in terms of net weight only. That petition has been assigned FDA Docket

No. 79P0170. All correspondence relating to that petition should include a reference to this docket number.

The Associate Commissioner for Regulatory Affairs has advised the National Conference that budgetary restrictions have caused delays in the agency's action on the petition. The Conference Chairman wrote to the FDA's Associate Commissioner for Regulatory Affairs acknowledging his interim response, reconfirming the Conference's interest in the subject matter of the petition, and stressing the importance of appropriate action by the agency. The Associate Commissioner has responded by stating that the Bureau of Foods has now been authorized to prepare a draft Federal Register document consistent with the Conference petition. The document will be subject to review by FDA bureaus concerned with prescription and over the counter drugs and cosmetics.

The Conference Chairman wrote to the FDA's Associate Commissioner for Regulatory Affairs acknowledging his interim response, reconfirming the Conference's interest in the subject matter of the petition, and stressing the importance of appropriate action by the agency.

(Item 503-6 was adopted)

504

METRIC LABELING

The Liaison Committee has been charged with the task of monitoring the need to amend Federal statutes to permit labeling in metric units only, pursuant to an orderly and voluntary conversion. The Conference filed with the U.S. Metric Board (USMB) a petition urging the Board to ask Congress and the President to initiate such legislative amendments as may be required for the stated purpose. In response to the Conference petition the USMB created a Federal interagency committee consisting of FDA, FTC, and USMB representatives to explore the problem and develop recommendations.

The committee met with staff representatives of the Board. They advised the Committee that (1) the Board had reported to Congress that no such amendments to Federal statutes are needed; (2) the Conference must specifically identify needed statutory amendments if Board support is to be expected; (3) there is a preference to avoid requests for legislative action if the problem can be solved other ways; and (4) the FDA and FTC had advised them that "metric only" labeling is possible without amending the Fair Packaging and Labeling Act if it is accomplished in an orderly sequence relative to logical product categories

in accordance with "notice and comment" rulemaking procedures.

The Board staff representatives promised that they would provide the Conference with a more formal written response to its petition accompanied by a copy of the Metric Board's most recent formal report to Congress.

The June 4, 1980, written response to the NCWM President from the Executive Director of the USMB communicated substantial doubt that "metric only" labeling can be used without prior amendment to the Federal Fair Packaging and Labeling Act. Moreover, it seems clear that the Board intends to defer any recommendation to Congress that the FPLA be amended. This policy appears to be premised upon the position that the FPLA, without amendment, permits the use of metric quantity declarations as the principal (though not exclusive) declarations.

In view of the foregoing, it is the committee's conclusion that in order to have any hope for success, a future NCWM request for a "metric only" regulation addressed to the FDA or the FTC must relate to a specific category of products which has for an extended time borne metric declarations as the principal declarations of labeled quantity. It seems also that as to each category of products, the applicable exemptions and the new Federal regulation would have to apply uniformly to all like articles within the category throughout the U.S. The committee has not been made aware of any asserted need for a change in any Federal regulation to permit "metric only" labeling.

(Item 504 was adopted)

505 TASK FORCE ON GRAIN MOISTURE MEASUREMENT ASSURANCE

A total of 33 representatives from fifteen States attended the Grain Moisture Measurement Task Force Seminar held in Atlanta, Georgia on September 11-13, 1979. The following States were represented: Alabama, Arkansas, California, Colorado, Delaware, Florida, Georgia, Illinois, Iowa, Kentucky, Louisiana, Mississippi, Missouri, South Carolina, and Tennessee. Dr. Carroll Brickenkamp from NBS and Mr. Charles Hurburgh from Iowa State University were also in attendance.

The three regional coordinators (Leo Letey, Colorado, Sid Colbrook, Illinois, and Jim O'Connor, Iowa) and Sam Hindsman, National Coordinator, chaired the task force meeting on January 14, 1980, at the Interim Committee Meetings of the NCWM at NBS in Gaithersburg, Maryland. A

summary of these task force activities are in the following paragraphs.

In Atlanta, laboratory personnel spent three days in the laboratory so as to develop greater uniformity in procedures and technique. Each participating State agreed to exchange five samples with USDA and with at least two other States to assure uniformity and traceability.

Uniformity in field testing procedures was also discussed by field personnel in Atlanta. All States in attendance agreed on uniform field testing procedures and the use of prepared samples of a known moisture content as the State standard. A model field test report form was constructed by the field personnel.

Administrative, laboratory and field representatives from the following States have agreed to use the uniform field test report on corn: Florida, Georgia, Kentucky, South Carolina, Tennessee, Illinois, California, Iowa, and Wisconsin.

The following States have agreed to use the same field test report forms for soybeans: Arkansas, Florida, Georgia, Kentucky, South Carolina, Tennessee, Illinois, Iowa, and Mississippi.

Field test reports will be submitted to the Office of Weights and Measures to the attention of Dr. Carroll Brickenkamp. The Office of Weights and Measures will provide the necessary information to Charles Hurburgh, Iowa State University, as supporting data for his research project on corn moisture measurement.

The Office of Weights and Measures will be in contact with Mr. Hurburgh and the participating States prior to the 1980 grain harvest. Procedures for submitting data will be clearly defined for those participating in the program.

Upon completion of the research projects, the information will be made available to the (1) Grain Moisture Measurement Assurance Task Force, (2) USDA, (3) moisture meter manufacturers, and (4) participating States.

The following letter to FGIS requesting immediate evaluation of the reference standard for moisture for corn and soybeans, was prepared and submitted by the task force. The letter was sent on September 20, 1979, by Sam Hindsman to Dr. Leland Bartelt, Administrator of FGIS.

"The National Conference on Weights and Measures (NCWM) is a voluntary organization of State and local weights and measures officials who have regulatory authority over the accuracy of measurements necessary for commerce. The NCWM is a forum for developing national standards of practice and performance for weighing and measuring in the U.S.

"The National Task Force on Grain Moisture Measurement of the NCWM has been established (1) to encourage the adoption by weights and measures officials of uniform laboratory and field test procedures to be used to test grain moisture meters, and (2) to evaluate the capabilities of moisture meters in order to set reasonable tolerances on the meters.

"Grain moisture meters are calibrated using the USDA official oven standards. However, the oven method can often give erroneous results especially for the major U.S. crops of corn and soybeans.

"Mr. W. H. Hunt (FGIS, retired) and Mr. S. W. Pixton in their article "Moisture-Its Significance, Behavior and Measurement" from the book Storage of Cereal Grains and Their Products (AACC, St. Paul, 1974) said "This [nonaqueous] loss [for soybeans] occurs at low temperatures in the early stages of drying and a satisfactory oven method has not been developed to counteract this." They also said that U.S. flint corn (which is being hybridized and grown more now in the U.S.) is essentially identical to corn grown in France and that "corn grown in France gave moisture values about 1% too low when dried by this [USDA] procedure." They also reported in that same article that "The Karl Fischer method, as modified by Hart and Neustadt (1957), apparently gives the true moisture content of grain. Therefore, all U.S. Department of Agriculture oven methods have been designed to give results which agree with those obtained by the Karl Fischer method," and that gas chromatograph (GC) "may...prove to be an accurate measure of 'true' moisture content. Agreement between the GC and Karl Fischer methods was excellent." Messrs. Hunt and Pixton's conclusions are based on the work of Weise, Burke, and Taylor from the National Bureau of Standards.

"The known inaccuracies added to the reported precision of the oven method may seriously undermine the accuracy of the moisture meters themselves. Therefore, the National Task Force on Grain Moisture Measurement requests FGIS to immediately re-establish

the Karl Fischer method in combination with gas chromatography as the USDA basic reference method, and, based upon these techniques, to re-evaluate the oven methods for precision and accuracy for corn and soybeans, in particular. (It may be, for example, that the meters should be calibrated using a basic reference such as Karl Fischer or GC, for corn and soybeans, whereas oven techniques are suitable for calibration of the meters for other crops such as wheat and rice.)

"We look forward to your response in this matter."

A seminar planned for Kansas City during the month of September, sponsored jointly by the task force and Dr. Cliff Watson, USDA, has been postponed until after the 1980 grain season. Plans are in progress to meet at the USDA grain moisture laboratory in Kansas City during the month of March 1981. The task force believes that the meeting will be more appropriate and useful for all concerned following an analysis of data received for corn and soybeans from the various States.

Dr. Carroll Brickenkamp (NBS) and Mr. Sam Hindsman (Arkansas) were among the U.S. delegation to the OIML meeting on grain moisture meters in Paris, France on October 2-4, 1979. Also in that delegation were Dr. Cliff Watson, FGIS, USDA, Mr. David Funk, Dickey-john Corp., and Mr. Lawrence Kirschen, Motomco Inc. The U.S. raised questions concerning the proposed tolerances on the meter and reference methods of the draft standard. A third meeting will have to be held before a final document can be prepared.

The task force does not have sufficient supporting information to submit recommendations to the L&R Committee or the S&T Committee concerning model regulations or device codes.

The committee wishes to express its thanks to the following States that are participating in the Grain Moisture Measurement Assurance program. Arkansas, California, Delaware, Florida, Georgia, Illinois, Iowa, Kentucky, Mississippi, Missouri, South Carolina, and Tennessee. Data has been received from the 1979 grain season and plans are proceeding for additional data during the 1980 grain season.

(Item 505 was adopted)

C. H. Greene, New Mexico, Chairman
 C. R. Cavagnaro, U.S. Office of Consumer Affairs
 C. E. Forester, Texas
 E. C. Heffron, Michigan
 M. S. Thompson, Chadwell, Kayser, Ruggles, McGee, and
 Hastings, Ltd.
 S. Hasko, Staff Assistant, NBS
 H. F. Wollin, Executive Secretary, NCWM

Committee on Liaison

(On motion of the committee chairman, the report of the Committee on Liaison voting key items 500 through 505 was adopted in its entirety as amended by the Conference. The results of the voting in the House of State Representatives and the House of Delegates under the Conference voting system are totalized in the table that follows. The Conference also authorized the executive secretary to make any appropriate editorial changes in the language adopted by the Conference.)

VOTING RESULTS--Committee on Liaison

Voting Key	House of State Representatives		House of Delegates	
	Yes	No	Yes	No
500	39	0	43	0
501				
502				
503-1				
503-2				
503-3				
503-4				
503-5				
503-6				
504				
505				

REPORT OF THE EXECUTIVE COMMITTEE

Presented by CHARLES H. VINCENT,
Conference Chairman, Director, Department of
Consumer Affairs, City of Dallas, Texas

(Thursday, June 26, 1980)

VOTING KEY

600

INTRODUCTION



The Executive Committee submits its final report for consideration by the 65th National Conference on Weights and Measures.

The following items were initially referred to the P & C Committee and the appropriate standing committees at the interim meeting in January and were subsequently referred to the Executive Committee for its consideration.

601

NEW MEMBERSHIP PLAN AND CHANGES TO THE NCWM ORGANIZATION AND PROCEDURE

The new membership plan that was adopted as a proposal by the 64th National Conference on Weights and Measures (NCWM) has been worked into the Conference Organization and Procedure. These changes were originally published in the Membership Prospectus that was distributed at the 1979 Conference and later revised and widely issued as an offer to join NCWM as a Charter Member.

The Executive Committee is pleased to report that 1078 Charter Memberships have been received to date. We trust that the new membership plan will be beneficial to the Conference.

In addition to the establishment of a paid membership plan, the NCWM Organization and Procedure has been expanded to reflect the growing nature of its programs and professional stature. In summary, these are the additions and changes that have been made to the NCWM Organization and Procedure:

(Item 601 was adopted)

601-1 DEFINITION OF MEASUREMENT OPERATIONS (ADDED)

Measurement operations is the total process of assuring compliance with those codes and other duly enacted regulatory measures that seek uniformity and equity based on measurement in commerce, general public health, welfare, and safety. The practitioners of measurement operations are employed at all levels of government, and in the private sector, and they perform a wide variety of functions including highly specialized laboratory calibration, field inspections, manufacturing, packaging, and maintenance operations. They deal with a highly diversified body of technical knowledge - yet they find common causes and interests in their basic objectives and work approaches within a distinct sector of the public service.

(Item 601-1 was adopted)

601-2 FEES (CHANGED)

All classes of membership: Active, advisory, and associate membership is on an annual basis (as of July 1 of each year) and is effectuated through:

- a) Registration at the annual meeting of the Conference and payment of the registration fee of \$75 or,
- b) Payment of an annual membership fee of \$25.

In both cases, the member receives all products and services of NCWM. The \$25 annual membership fee will be credited to the registration fee if paid in advance by those who attend the Conference annual meeting.

(Item 601-2 was adopted)

601-3 PROFESSIONALISM IN MEASUREMENT OPERATIONS (ADDED)

The impact of professionalism will be felt at all levels of government, in industry, and by the general public. Membership in this Conference will be highly beneficial to all those who employ, work with, are regulated by, or are served by you. Some of the benefits visualized are a rationalized structure of the applied measurement function, improved regulatory procedures, and a general upgrading of competence among practitioners throughout the Nation. You will have an expanded appreciation of all functions beyond the technical aspects - including the intent of the legislation, general administrative and regulatory laws, sociology and psychology, and a fundamental knowledge of the activities with which you must interface.

(Item 601-3 was adopted)

601-4 DUTIES OF OFFICERS (CHANGED)

The NCWM Chairman has the responsibility to make appointments, based on the recommendations of NBS-OWM and approved by the Executive Committee, to the several annual and standing committees and to appoint other Conference officials as needed during his term of office. The appointment of standing committee members had previously been made by the Conference President.

(Item 601-4 was adopted)

601-5 PROGRAM DEVELOPMENT (ADDED)

The NCWM constantly strives to expand its capabilities for providing meaningful services to the profession. Professional development projects undertaken are aimed at the preparation of comprehensive guidelines for use in conducting educational and training programs at colleges, universities, and other organizations involved in such activities. Standards for the conduct of certification programs will be developed and supplemental competency measurement systems will be designed as needed. Research is conducted in the principles and practices of the profession to improve and expand the tools available to practitioners in meeting present and future job needs. Systems and procedures for maintaining the NCWM coordinating services will continually be updated.

As the various milestones toward the completion of basic development programs are reached, NCWM's ability to provide services to the profession will grow. The real impact of professionalism will be felt with the implementation of each new service, product or recommendation.

(Item 601-5 was adopted)

601-6 VOTING SYSTEM (CHANGED)

As a result of action taken by the 64th NCWM, the section on Floor Amendments has been revised as follows:

- a) Committee chairmen are allowed to offer amendments during the day of voting to make editorial changes in their final reports.
- b) Substantive changes can be made at the request of weights and measures officials only, and:

- 1) a majority of the voting delegates of each House must agree to debate a proposed amendment, and
- 2) a two-thirds favorable vote of each House on the amendment is required for passage (the requirement for a minimum vote of 27 in both Houses also applies.)

(Item 601-6 was adopted)

601-7 MEMBERSHIP APPLICATION (ADDED)

The NCWM invites all who are interested in or affected by weights and measures administration and measurement technology to become members of the Conference. An application form is provided with the Organization and Procedure booklet. The membership period runs from July 1 to June 30. [Note: The NCWM Executive Committee approved the implementation of a Charter Membership drive which ran from January 1 to June 1, 1980.] Members will receive the following publications and material:

- o NBS Handbook 44, "Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices"
- o NBS Handbook 130, "Model State Laws and Regulations"
- o Report of the Annual Meeting of the Conference
- o NCWM announcements, programs, and other published material and information
- o Membership certificate and wallet-size membership card.

(Item 601-7 was adopted)

602 PROPOSALS TO NCWM COMMITTEES

The Conference standing committees have expressed their concern with the quality of content and timeliness of proposals submitted to them for consideration during the interim meetings. A realistic approach to effectively deal with the growing number and complexity of issues brought to the attention of the committees must be implemented. This is necessary to assure a manageable workload and to adequately analyze and develop recommendations on each proposal.

In 1977 the Committee on National Measurement Policy and Coordination recommended a policy to deal with this problem and certain procedures of the standing committees. The policy as adopted by the Conference that year called upon all organizations and individuals to adhere to the guidelines in the policy statement for submission of proposals to NCWM committees. The policy guidelines pertaining to proposals are as follows:

- a) An interim meeting of the standing committees of the NCWM shall be scheduled approximately five months (usually in January) prior to the annual Conference meeting.
- b) All proposals to be considered by a committee for action during the upcoming Conference shall be presented in writing to the committee sixty days (usually by December 1) prior to the interim meetings.
- c) Proposals should contain a concise statement of the problem and clearly outline the purpose and national need for its consideration.
- d) Proposals should include the submission of adequate background material including test data, analysis of test data, or other appropriately researched and documented material from which a committee will be able to make a suitable judgment for either a firm recommendation or to consider the need for further study. When possible, solutions to problems shall be proposed and stated in specific language in amendment form to Conference documents.
- e) Weights and measures officials are encouraged to utilize their regional associations for initial exploration of issues and to use the resources of all member States within that regional association to assist in the development of well documented proposals where applicable.
- f) If a proposal involves a new area of weights and measures activity, it would be appropriate to make recommendations for both regulations and test methods to provide for proper enforcement.

- g) Tentative agendas listing the issues that may be discussed by the committees during the interim meetings should be available upon request from the Office of Weights and Measures thirty days (usually by January 1) prior to the interim meetings.
- h) Upon request, committees will hold hearings for presentations by Government officials, industry representatives, or consumer groups during the interim meetings. Requests for hearings must be received at least two weeks prior to the start of the meetings so scheduling can be arranged.

(Copies of the entire policy statement are available from the NCWM Executive Secretary.)

The Executive Committee strongly recommends that all proposals that fail to meet these guidelines be rejected and those who have offered the proposal should be notified as to the reason for rejection. The Executive Committee does not feel that a standard format for proposals would be necessary or desirable for all committees. For this reason, each standing committee may offer its recommendations on a format for proposals to be submitted to their committee and which would be in keeping with the overall policy and guidelines of the Conference. The committee announces that all proposals for the 66th Conference, with supportive data, are due to the respective committees by November 18, 1980. The 1981 interim committee meetings will be held January 19-23, 1981 at the National Bureau of Standards. [Editors' note: changed to January 14-17, 1981, at Texas A&M University, College Station, Texas]

(Item 602 was adopted)

603

FUTURE CONFERENCE PLANS

In response to the recommendation adopted by the Conference last year, the Committee has approved a five-year plan concerning future meeting dates and sites as developed by the Conference Executive Secretary. The site selection and schedule is as follows:

<u>Date</u>	<u>City</u>	<u>Hotel</u>
July 12-17, 1981	St. Louis, MO	Stouffer's Riverfront Towers
July 11-16, 1982	Atlanta, GA	Marriott
July , 1983	Sacramento, CA	Not selected
July , 1984	Boston, MA	Not selected
July , 1985	Washington, DC	Not selected

Although specific dates have not yet been determined for 1983-1985, the plan is to make arrangements for either the second or third week in the month of July. Negotiations are underway for the selection of the headquarters hotel in each city.

Looking ahead to next year, St. Louis is a very lovely and exciting city and we are sure the Conference members will enjoy the many outstanding facilities and visitor attractions that are offered there.

The Honorable George Busbee, Governor of the State of Georgia, and Mayor Maynard Jackson, City of Atlanta, have written to the Conference expressing their great delight and support concerning the plan to meet in Atlanta in 1982.

(Item 603 was adopted)

604 REPORT OF THE ASSOCIATE MEMBERSHIP
 COMMITTEE

(Presented by Eric Allen, The Measuregraph Co.,
Committee Chairman)

At its meeting on Sunday, June 21, the committee discussed and completed its plans for the industry party which took place on Tuesday evening in the Blue Room and which was in keeping with tradition of parties of the past.

The committee has had an opportunity to review the correspondence files of the Associate Membership Committee for the past several years, dating back to 1968. The one theme that runs through this 12 years of correspondence and reports to this Conference is the concern that the committees of the Conference do not make use of the vast reservoir of expertise represented in the associate membership. Again this year, we urge you to consider this expertise in your planning.

(Item 604 was adopted)

C. H. VINCENT, Chairman	K. R. ADCOCK, Ohio
J. R. BIRD, Vice Chairman	M. W. CAIN, Virginia
E. C. HEFFRON, Vice Chairman	M. A. MALDONADO, Puerto Rico
E. KEELEY, Vice Chairman	R. J. CORD, Prince Georges County, Maryland
W. C. SULLIVAN, Vice Chairman	E. F. DELFINO, California
A. M. NELSON, Treasurer	P. M. FULLINWIDER, Arizona
J. H. LEWIS, Chaplain	E. P. SKLUZACEK, Minnesota
H. F. WOLLIN, Executive Secretary	D. R. SMITH, Santa Clara County, California
	F. A. THOMAS, Pennsylvania

Executive Committee

(On motion of the committee chairman, the report of the Executive Committee voting key items 600 through 604 was adopted in its entirety by the Conference. The results of the voting in the House of State Representatives and the House of Delegates under the Conference voting system are totalized in the table that follows. The Conference also authorized the Executive Secretary to make any appropriate editorial changes in the language adopted by the Conference, provided that the requirements thus adopted are strictly adhered to.)

VOTING RESULTS - Executive Committee

Voting Key	House of State Representatives		House of Delegates	
	Yes	No	Yes	No
600	37	0	52	0
601	35	0	44	0
601-1				
601-2				
601-3				
601-4				
601-5				
601-6				
601-7				
602	37	0	43	0
603	38	0	44	0
604	38	0	46	0

REPORT OF THE RESOLUTIONS COMMITTEE

Presented by THOMAS W. SCOTT, Chief,
Measurement Section, Consumer Standards Division,
Department of Agriculture, State of North Carolina

(Thursday, June 26, 1980)

VOTING KEY



700

INTRODUCTION

The Resolutions Committee expresses its appreciation on behalf of the 65th National Conference on Weights and Measures to each and every one who contributed their time and talents towards the arrangements for, the conduct of, and participation in this National Conference.

701

THANKS TO PROGRAM CONTRIBUTORS

The Conference gives a special vote of thanks to:

- 1) All speakers of the Conference for their expertise, information, and contributions to the program.
- 2) All officers and appointed officials of the 65th National Conference on Weights and Measures for their assistance and service towards a very successful Conference.
- 3) All committee members for their time and efforts throughout the past year to prepare and present their reports.
- 4) The governing officials of the State and local jurisdictions for their interest and support in weights and measures administration in the United States.
- 5) Representatives of business and industry for their cooperation, assistance, and hospitality.
- 6) Consumer representatives, members of the public media, and other participants who have shown their interest and support for the National Conference on Weights and Measures.
- 7) The staff of the Shoreham Hotel for their fine facilities, assistance, and courtesies, all of which contributed to the enjoyment and comfort of the delegates.

- 8) To the National Bureau of Standards and the Office of Weights and Measures for planning and conducting the work and program of the National Conference on Weights and Measures.

(Item 701 was adopted)

The following resolutions of appreciation are presented for adoption by the members of the Conference:

- 702 Be it resolved that the National Conference thank the members of the International Organization of Legal Metrology for their attendance and participation.
- 703 Be it resolved that the National Conference express its appreciation to John H. Lewis, State of Washington, for his long service as the Conference Chaplain.

(Items 702 and 703 were adopted)

T. W. SCOTT, North Carolina, Chairman
L. LETEY, Colorado
B. MERRICK, Missouri
L. MILLER, Dayton, Ohio
J. M. O'CONNOR, Iowa
E. J. STEPHENS, Utah

Resolutions Committee

(On motion of the committee chairman, the report of the Resolutions Committee, voting key items 700 through 703, was adopted in its entirety by the Conference. The results of the voting in the House of State Representatives and the House of Delegates under the Conference voting system are totalized in the table that follows. The Conference also authorized the Executive Secretary to make any appropriate editorial changes in the language adopted by the Conference.)

VOTING RESULTS - Resolutions Committee

Voting Key	House of State Representatives		House of Delegates	
	Yes	No	Yes	No
700	38	0	46	0
701				
702				
703				

REPORT OF THE NOMINATIONS COMMITTEE

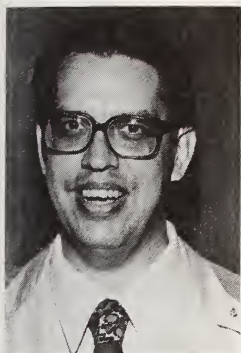
Presented by KENDRICK J. SIMILA, Administrator,
Weights and Measures Division, Department
of Agriculture, State of Oregon

(Thursday, June 26, 1980)

VOTING KEY

800

INTRODUCTION



The Nominations Committee met during the Conference for the purpose of selecting a slate of nominees for all elective offices and for the ten elective memberships of the Executive Committee. In the selection of nominees from the active membership, consideration was given to the professional experience and qualifications of individuals, attendance records, geographical distribution, Conference participation, and other factors deemed by the committee to be important.

801

NOMINATIONS

The Nominations Committee submits the following names in nomination for office to serve during the ensuing year and at the 66th National Conference on Weights and Measures:

Nominations

Chairman:

E. H. Stadolnik, Massachusetts

Vice Chairmen:

C. H. Greene, New Mexico

S. F. Hindsman, Arkansas

P. E. Nichols, Alameda County, California

R. W. Probst, Wisconsin

Treasurer:

A. M. Nelson, Connecticut

Chaplain:

F. W. Daniels, Wayne County, Indiana

1. R. Anderson, New York
2. T. F. Brink, Vermont
3. L. D. Holloway, Idaho
4. J. O'Connor, Iowa
5. J. L. O'Neill, Kansas
6. K. Petite, Chicago, Illinois
7. N. M. Ross, Omaha, Nebraska
8. J. Shelton, Tennessee
9. D. Smith, North Carolina
10. E. J. Stephens, Utah

(There being no further nominations from the floor, the Chairman declared nominations closed and requested the Executive Secretary to cast a unanimous ballot for all nominees.)

802

FUTURE ISSUES

During its deliberations the committee discussed two issues impacting on the current Organization and Procedures of the Conference. The Committee wishes to share with the Conference membership knowledge of its having discussed these issues so that all may be aware of them.

The first issue deals with the length or term of office of the Conference Chairman. Since the inception of the Conference 70 years ago, the Conference Chairman has served a one-year term. A case can be made that perhaps the time has come to consider whether the term of office of the Conference Chairman should be changed. Specifically the issue is whether a term of office for the Conference Chairman longer than one year may be appropriate or called for.

Factors that give rise to this issue include, for example, the increasing complexity of legal metrology issues, the short time the Conference Chairman currently has to effectively lead and represent the Conference, the loss of continuity that frequent changes in the Chairmanship can bring, and the incongruence of a one-year term with a two-year appointment of the Conference's Chairman in alternate years to the U.S. OIML Advisory Committee.

One approach the Conference could take is to change the term of office of its Chairman to two years. Another approach might be the re-election of Chairmen able and willing to serve more than one term. Other possibilities concerning the term of office for the Conference Chairman also exist.

The second issue discussed by the Committee was that of modifications to the makeup and size of the Executive Committee. Specifically the concept of a nine-member Conference Executive Committee made up of the five members of the Policy and Coordination Committee and the four Conference Vice Chairmen was discussed. In a number of respects such an organizational structure for the Executive Committee could better suit the needs of the Conference.

Both of these issues are obviously not action items at this 65th Conference. The Committee on Nominations took no position on these issues. Our intention in discussing them, and mentioning them now, has been to stimulate further thought on how the Conference can best structure itself for the decade of the 80s and beyond. If changes in these areas are in fact warranted, during the coming months they can be proposed, and in due course, debated and dealt with. We hope you will participate actively in this process.

(Item 802 was adopted)

K. J. SIMILA, Oregon, Chairman
 S. D. ANDREWS, Florida
 J. T. BENNETT, Connecticut
 G. L. JOHNSON, Kentucky
 J. F. LYLES, Virginia
 J. H. LEWIS, Washington
 R. L. THOMPSON, Maryland

Nominations Committee

(On motion of the committee chairman, the report of the Nominations Committee, voting key items 800 through 802, was adopted in its entirety by the Conference. The results of the voting in the House of Representatives and the House of Delegates under the Conference voting system are totalized in the table that follows.)

VOTING RESULTS - Nominations Committee

Voting Key	House of State Representatives		House of Delegates	
	Yes	No	Yes	No
800	40	0	51	2
801	39	0	55	0
802	38	0	53	2

REPORT OF THE AUDITING COMMITTEE

Presented by FRED A. GERK, Associate Chief,
Division of Consumer and Marketing Services,
Department of Agriculture, State of New Mexico

(Thursday, June 26, 1980)



VOTING KEY

900

The Auditing Committee met on Wednesday morning, June 25, for the purpose of reviewing the financial records of the Conference Treasurer, Mr. Allan M. Nelson. The Committee finds these records to be in accordance with Conference procedure and correct.

F. A. GERK, New Mexico, Chairman
R. H. Claussen, Porter County, Indiana
G. J. Tommasi, Middletown, Connecticut

Committee on Auditing

(On motion of the committee chairman, the report of the Auditing Committee, voting key item 900, was adopted by the Conference. The results of the voting in the House of Representatives and the House of Delegates under the Conference voting system are totalized in the table that follows.

VOTING RESULTS - Auditing Committee

Voting Key	House of State Representatives		House of Delegates	
	Yes	No	Yes	No
900	39	0	45	0

REPORT OF THE CONFERENCE TREASURER

Presented by ALLAN M. NELSON, Metrologist, Weights and Measures Division, Department of Consumer Protection, State of Connecticut

(Thursday, June 26, 1980)

VOTING KEY



1000 INTRODUCTION

It is my pleasure to report to you today on the financial status of the Conference treasury as follows:

Balance on hand, July 1, 1979 \$ 4,909.27

General Account (including \$2,070.00 receivable from U.S. Metric Board)	\$ 4,347.04
Medallion Account	394.13
Necktie Account	511.75
Membership Plaque Account	<u>(343.65)</u>

TOTAL \$ 4,909.27

Total cash balance, July 1, 1979	\$ 2,839.27
*Promotional Account Cash Balance	<u>562.23</u>
General Account Cash Balance	\$ 2,277.04

RECEIPTS

Registrations-64th Conference	\$17,300.00
346 @ \$50.00	
Breakfast tickets-68 @ \$5.00	340.00
Party tickets -132 @ \$8.00	1,056.00
Ladies tour -68 @ \$5.00	340.00
U. S. Metric Board payment	2,070.00
Certificates of Deposit	
Redeemed 11/13/79	15,000.00
Interest on Certificates of Deposit	209.37
Preregistrations-65th Conference	
49 @ \$50.00	2,450.00

Charter membership	
1,068 members @ \$25.00	26,700.00
Pacific Telephone Company rebate	.62
Union Trust Account Transfer	<u>16.24</u>
TOTAL RECEIPTS	<u>\$65,482.23</u>
TOTAL of General Account Cash Balance	
July 1, 1979 and Receipts	<u>\$67,759.27</u>

DISBURSEMENTS

Lacy H. DeGrange, OIML trip	\$ 491.30
Pronto Print-Conference Copy Service	628.95
Johnny Reitz, Conference Orchestra	650.00
Two 90-day Certificates of Deposit	10,000.00
Gray Line Sightseeing Co., Ladies Tour	552.50
Tri-Met. Conference Outing Transportation	1,737.42
Red Lion Motor Inn, Conference Expenses	2,868.03
Audio/Visual Rental & Services	
Conference Rental	714.65
Sam F. Hindsman, OIML Trip	931.00
Greater Portland Convention & Visitors	
Association-Registration Desk	114.37
Franklin Press, letterheads	51.00
Associate Membership Committee/NCWM Outing	1,056.00
Gerber Foto, Conference photographer	543.88
Oregon Department of Agriculture	
Conference expenses	105.37
IBM Typewriter rental	105.00
Frank Nagele, OIML trip	545.79
Franklin Press, business cards	25.02
Frank Nagele, balance of travel OIML trip	18.30
Bank charge, printed checks	11.11
Charles Vincent travel Metric Board & NASDA	836.20
Charles Vincent travel Southern Conference	386.75
Interim meeting expenses	13,452.45
Franklin Press, letterheads	52.30
Hartford Postmaster (50 stamps)	7.50
James Akey, Treasury expenses	209.37
Hartford Stamp Works, Inc., rubber stamp	6.42
Washington Boat Lines, Inc. deposit	300.00
Association Management Magazine, renewal	15.00
Allan M. Nelson, Treasurer,	
Conference transportation	176.00
Xerox Corporation, placement and copy	
machine rental	183.83
Xerox Corporation, supplies (developer)	37.80
National Bureau of Standards, Membership	
Brochure, HB 130, Conference Announcement	<u>7,943.97</u>

TOTAL DISBURSEMENTS		\$44,757.28
General Account Cash Balance as of June 1, 1980		\$23,001.99
TOTAL General Account Disbursements and Cash Balance		<u>\$67,759.27</u>
Promotional Account Cash Balance as of July 1, 1979	\$	562.23

RECEIPTS

OWM Educational Material	\$ 240.00	
Sale of 67 Conference Plaques	<u>335.00</u>	\$ 575.00
TOTAL		<u>\$ 1,137.23</u>

DISBURSEMENTS

Donald Lynch-Conference caps	\$ 50.00	<u>50.00</u>
Promotional Account CASH BALANCE as of June 1, 1980		<u>\$ 1,087.23</u>

RECAP

General Account Cash Balance June 1, 1980	\$23,001.99
Promotional Account Cash Balance June 1, 1980	<u>1,087.23</u>
TOTAL cash balance June 1, 1980	<u>\$24,089.22</u>

DEPOSITORIES

Southington Bank & Trust Co., Southington, CT	\$24,072.98
Union Trust Co., Gaithersburg, MD	<u>16.24</u>
	<u>\$24,089.22</u>

*Medallion, Necktie, and Membership Plaque Accounts have been consolidated into the Promotional Account for the Committee on Education, Administration, and Consumer Affairs.

(signed) Allan M. Nelson, Treasurer

(On motion of the Treasurer, the report of the Conference Treasurer, voting key item 1000, was adopted by the Conference. The results of the voting in the House of State Representatives and the House of Delegates under the Conference voting system are totaled in the table that follows.)

VOTING RESULTS - Conference Treasurer

Voting Key	House of State Representatives		House of Delegates	
	Yes	No	Yes	No
1000	39	0	44	0

REGISTRATION LIST
65TH NATIONAL CONFERENCE ON WEIGHTS AND
MEASURES

June 22-27, 1980

Shoreham Hotel, Washington, D.C.

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